CURRICULUM VITAE

Dr. Tuomas Sandholm

BIOGRAPHY

Tuomas Sandholm is Angel Jordan University Professor of Computer Science at Carnegie Mellon University and a serial entrepreneur. His research focuses on the convergence of artificial intelligence, economics, and operations research. He is Co-Director of CMU AI. He is the Founder and Director of the Electronic Marketplaces Laboratory. He has published over 500 peer-reviewed papers, holds 29 patents, and his h-index is 101. In addition to his main appointment in the Computer Science Department, he holds appointments in the Machine Learning Department, Ph.D. Program in Algorithms, Combinatorics, and Optimization (ACO), and CMU/UPitt Joint Ph.D. Program in Computational Biology.

He has built optimization-powered electronic marketplaces since 1989, and has fielded several of his systems. In parallel with his academic career, he was Founder, Chairman, first CEO, and CTO/Chief Scientist of CombineNet, Inc. from 1997 until its acquisition in 2010. During this period the company commercialized over 800 of the world's largest-scale generalized combinatorial multi-attribute auctions, with over $60 billion in total spend and over $6 billion in generated savings.

Since 2010, his algorithms have been running the national kidney exchange for the United Network for Organ Sharing, where they autonomously make the kidney exchange transplant plan for 80% of U.S. transplant centers together each week. He also co-invented never-ending altruist-donor-initiated chains and his algorithms created the first such chain. Such chains have become the main modality of kidney exchange worldwide and have led to around 10,000 life-saving transplants. He invented liver lobe and multi-organ exchanges; the first liver-kidney swap took place in 2019.

Sandholm has developed the leading algorithms for several general classes of game with his students. The team that he leads is the multi-time world champion in computer heads-up no-limit Texas holdem, which is the main benchmark and decades-open challenge problem for testing application-independent algorithms for solving imperfect-information games. Their AI Libratus became the first and only AI to beat top humans at that game. Then their AI Pluribus became the first and only AI to beat top humans at the multi-player game. That is the first superhuman milestone in any game beyond two-player zero-sum games. He is Founder and CEO of Strategy Robot, Inc., a CMU spinout that builds AI software products for strategic reasoning under imperfect information for US government military, intelligence, security, and cybersecurity applications. The company has already built four such software products for game-theoretic analysis of four different classes of DoD problems: COA generation, portfolio planning, aerial planning, and base defense.

He served as the redesign consultant of Baidu's sponsored search auctions and display advertising markets in 2009–2013; within two years Baidus market cap increased 5x to $50 billion due to doubled monetization per user. He has served as consultant, advisor, or board member for Yahoo!, Google, Chicago Board Options Exchange, swap.com, Granata Decision Systems (now part of Google), Rare Crowds (now part of Media Math), and others.

He earned a Ph.D. and M.S. in computer science and a Dipl. Eng. (M.S. with B.S. included) with distinction in Industrial Engineering and Management Science. Among his honors are the AAAI Award for AI for the Benefit of Humanity, Vannevar Bush Faculty Fellowship, Alfred Kordelin Prize, IJCAI Minsky Medal, IJCAI McCarthy Award, AAAI Engelmore Award, IJCAI Computers and Thought Award, inaugural ACM Autonomous Agents Research Award, CMU's Allen Newell Award for Research Excellence, Sloan Fellowship, NSF Career Award, Carnegie Science Center Award for Excellence, Edelman Laureateship, and the Goldman Sachs 100 Most Intriguing Entrepreneurs Award. He is Fellow of the ACM, AAAI, INFORMS, AAAS, and AAIS. He holds an honorary doctorate from the University of Zurich.

EMPLOYMENT

(Founding of companies and consulting are listed separately later.)

1/2001–	**Carnegie Mellon University** *Angel Jordan University Professor of Computer Science*, 5/2020– *Angel Jordan Professor of Computer Science*, 2/2018– *Professor*, 7/2006–2/2018 *Associate Professor*, 1/2001–6/2006 Computer Science Department
2017–	**Carnegie Mellon University** *Co-Director* CMU AI
1/2001–	**Carnegie Mellon University** *Founder and Director* Electronic Marketplaces Laboratory
5/2013–	**Carnegie Mellon University** *Member* Ph.D. Program in Algorithms, Combinatorics, and Optimization (ACO)
12/2012–	**Carnegie Mellon University** *Affiliated Professor* Carnegie Mellon/University of Pittsburgh Joint Ph.D. Program in Computational Biology
12/2007–	**Carnegie Mellon University** *Affiliated Professor* Machine Learning Department
1/2001–	**Carnegie Mellon University** *Affiliated Faculty* Theory Group
4/2023–	**Carnegie Mellon University** *Affiliate Faculty* Institute for Complex Social Dynamics, Dietrich College
7/2000–12/2000	**Washington University** *Associate Professor* Department of Computer Science
8/1996–6/2000	**Washington University** *Assistant Professor* Department of Computer Science

8/1997-12/2000	**Washington University** *Adjunct faculty member (courtesy appointment)* Center for Optimization & Semantic Control Department of Systems Science and Mathematics
9/1992–8/1996	**University of Massachusetts, Amherst** *Research Assistant* Distributed Problem Solving Lab, Department of Computer Science
9/1995–12/1995	**University of Massachusetts, Amherst** *Teaching Associate*, Full lecturing responsibility Department of Computer Science
12/1990—8/1992	**Technical Research Centre of Finland** *Research Scientist*, Laboratory for Information Processing Espoo, Finland
6/1990–12/1990	**Nokia Research Center, Knowledge Engineering Department** *Research Scientist* (intern during college) Espoo, Finland
12/1988—5/1990	**Kielikone Co.** *Programmer (during college studies)* Espoo, Finland
6/1989–7/1989	**Smart and Final Iris, Co.** *Database Developer (during a college summer break)* Los Angeles, CA

EDUCATION

5/1994–9/1996	**Ph.D., Computer Science, GPA 4.0/4** University of Massachusetts, Amherst Thesis title: Negotiation among self-interested computationally limited agents Ph.D. Committee: 1. Victor Lesser (chair), University of Massachusetts, Computer Science 2. James Kurose, University of Massachusetts, Computer Science 3. Shlomo Zilberstein, University of Massachusetts, Computer Science 4. Mark Fox, U. of Toronto, Industrial Engineering/Computer Science 5. Herbert Gintis, University of Massachusetts, Economics

9/1992–5/1994 **M.S., Computer Science, GPA 3.95/4**
University of Massachusetts, Amherst
Master's Project (2 parts):
1. Utility-based termination of anytime algorithms
2. A new order parameter for 3SAT

9/1988–12/1991 **Dipl. Eng. (like M.S. with B.S. included) *with distinction***
Industrial Engineering and Management Science
Helsinki University of Technology, Finland
Majors:
1. Knowledge engineering, GPA 4.7/5
2. Business strategy and international marketing, GPA 4.2/5
3. Systems and operations research, GPA 5.0/5
In addition, 18 post-Master's credits in majors 1. and 3.

8/1987–7/1988 **Airforce Academy, Finland**
Pilot Second Lieutenant
Obligatory military service; highest possible officer rank achieved

PERSONAL

- Security clearance: Top Secret
- Born December 1968, Helsinki, Finland. Citizenships: US and Finland. Married, two children.
- URL: http://www.cs.cmu.edu/~sandholm
- Languages: Finnish, English, Swedish, German.
- Hobbies:
  - Windsurfing. Best results: 12th in the Worlds (1987), 5th in the Europeans (1987), 1st in the Finnish Nationals (1987), ranking #1 in Finland (1986), Formula class US Masters 2nd place (2005).
  - Sailboat racing. Best results: Beneteau 36.7 Corinthian class North American Champion 2016 (as tactician), 10th in Flying Scot North American Championships 2019 (as captain), 6th in Flying Scot North American Championships 2021 (as captain), 8th in Flying Scot North American Championships 2022 (as captain).
  - Squash
  - Infrequent hobbies: chess, Go, poker, snowboarding
  - Past hobby: Airplane piloting, including acrobatic

Primary research interests: Artificial intelligence; market design; optimization (search and integer programming, combinatorial optimization, stochastic optimization, and convex optimization); kidney exchange; liver exchange; cross-organ exchange; game theory; mechanism design; electronic commerce; multiagent systems; auctions and exchanges; automated negotiation and contracting; equilibrium finding; algorithms for solving games; opponent modeling and exploitation; advertising markets; sourcing; prediction markets; voting; coalition formation; preference elicitation (especially from multiple agents); normative models of bounded rationality; resource-bounded reasoning; fairness; privacy; multiagent learning; safe exchange; machine learning.

Secondary research interests: Constraint satisfaction; reputation mechanisms; networks.

PUBLICATION LIST

JOURNAL PAPERS

1. Balcan, N, Prasad, S., and Sandholm, T. Bicriteria Multidimensional Mechanism Design with Side Information. *Mathematics of Operations Research*, accepted, to appear. (Extended version of our NeurIPS-23 paper.)

2. Luca Carminati, Brian Hu Zhang, Federico Cacciamani, Junkang Li, Gabriele Farina, Nicola Gatti, and Tuomas Sandholm. 2026. Efficient representations for team and imperfect-recall equilibrium computation. *Artificial Intelligence*, 356, 104529.

3. Zhang, B., Farina, G., Celli, A., and Sandholm, T. 2026. Optimal Correlated Equilibria in General-Sum Extensive-Form Games: Fixed-Parameter Algorithms, Hardness, and Two-Sided Column-Generation. *Mathematics of Operations Research*, 51(1), 60–91. (Extended version of our EC-22 paper.)

4. Farina, G., Kroer, C., and Sandholm, T. 2025. Better Regularization for Sequential Decision Spaces: Fast Convergence Rates for Nash, Correlated, and Team Equilibria. *Operations Research*, 73(5): 2430-2457.

5. Balcan, N., Sandholm, T., and Vitercik, E. 2025. Generalization Guarantees for Multi-item Profit Maximization: Pricing, Auctions, and Randomized Mechanisms. *Operations Research*, 73(2), 648–663.

6. Anagnostides, I., Sollie, Z., Kilic, A., and Sandholm, T. 2025. Machine Learning for Predicting Offer Acceptance in Heart Transplantation. *The Journal of Heart and Lung Transplantation*, 44(4), S669–S670. Abstract.

7. Anagnostides, I., Sollie, Z., Kilic, A., and Sandholm, T. 2025. Policy Optimization for Dynamic Heart Transplant Allocation. *Circulation*, 152(3): A4369427–A4369427. Abstract.

8. Balcan, N., DeBlasio, D., Dick, T., Kingsford, C., Sandholm, T., and Vitercik, E. 2024. How much data is sufficient to learn high-performing algorithms? *Journal of the ACM (JACM)*, 71(5), 1–58. (Extended version of our STOC-21 paper.)

9. Balcan, N., Dick, T., Sandholm, T., and Vitercik, E. 2024. Learning to branch: Generalization guarantees and limits of data-independent discretization. *Journal of the ACM (JACM)*, 71(2): 1–73.

10. Schmucker, R., Farina, G., Faeder, J., Fröhlich, F., Sinan Saglam, A., and Sandholm, T. 2021. Combination treatment optimization using a pan-cancer pathway model. *PLOS Computational Biology* 17(12). Earlier version available in bioRxiv.

11. Ayers, B., Sandholm, T., Gosev, I., Prasad, S., and Kilic, A. 2021. Using Machine Learning to Improve Survival Prediction After Heart Transplantation. *Journal of Cardiac Surgery* 36(11): 4113–4120.

12. Kroer, C. and Sandholm, T. 2020. Limited Lookahead in Imperfect-Information Games. *Artificial Intelligence* 283, Special Issue on Autonomous Agents Modelling Other Agents.

13. Braggion, E., Gatti, N., Lucchetti, R., Sandholm, T., and von Stengel, B. 2020. Strong Nash equilibria and mixed strategies. *International Journal of Game Theory*, 49(3): 699–710.

14. Blum, A., Dickerson, J., Haghtalab, N., Procaccia, A., Sandholm, T., and Sharma, A. 2020. Ignorance is Almost Bliss: Near-Optimal Stochastic Matching with Few Queries. *Operations Research* 68(1): 16–34.

15. Kroer, C., Waugh, K., Kilinç-Karzan, F., and Sandholm, T. 2020. Faster algorithms for extensive-form game solving via improved smoothing functions. *Mathematical Programming* Series A, 179: 385–417.

16. Dickerson, J., Procaccia, A., and Sandholm, T. 2019. Failure-Aware Kidney Exchange. *Management Science* 65(4): 1768-1791.

17. Brown, N. and Sandholm, T. 2019. Superhuman AI for multiplayer poker. *Science* 365(6456): 885–890. This was also the cover story.

18. Nath, S. and Sandholm, T. 2019. Efficiency and budget balance in general quasi-linear domains. *Games and Economic Behavior* 113: 673–693.

19. Brown, N. and Sandholm, T. 2018. Superhuman AI for heads-up no-limit poker: Libratus beats top professionals. *Science* 359(6374): 418–424. (Appeared online in *Science* 12/17/2017.)

20. Dickerson, J. and Sandholm, T. 2017. Multi-Organ Exchange. *Journal of Artificial Intelligence Research (JAIR)* 60: 639–679.

21. Sandholm, T. and Likhodedov, A. 2015. Automated Design of Revenue-Maximizing Combinatorial Auctions. *Operations Research* 63(5): 1000–1025.

22. Ganzfried, S. and Sandholm, T. Safe Opponent Exploitation. 2015. "Best of EC-12" Special Issue of the journal *ACM Transactions on Economics and Computation (TEAC)* 3(2), Article 8, 1–28.

23. Sandholm, T. 2015. Solving imperfect-information games. *Science* 347(6218): 122–123.

24. Othman, A., Pennock, D., Reeves, D., and Sandholm, T. 2013. A Practical Liquidity-Sensitive Automated Market Maker. *ACM Transactions on Economics and Computation (TEAC)* 1(3), Article 14, 25 pages.

25. Othman, A. and Sandholm, T. 2013. The Gates Hillman Prediction Market. *Review of Economic Design* 17(2): 95–128.

26. Gilpin, A., Peña, J., and Sandholm, T. 2012. First-Order Algorithm with $O(\ln(1/\epsilon))$ Convergence for ϵ-Equilibrium in Two-Person Zero-Sum Games. *Mathematical Programming* 133(1-2): 279-298.

27. Conitzer, V. and Sandholm, T. 2012. Computing Optimal Outcomes under an Expressive Representation of Settings with Externalities. *Journal of Computer and System Sciences (JCSS)*, special issue on Knowledge Representation and Reasoning 78(1): 2–14.

28. Yin, Z., Jiang, A., Tambe, M., Kiekintveld, C., Leyton-Brown, K, Sandholm, T., Sullivan, J. 2012. TRUSTS: Scheduling Randomized Patrols for Fare Inspection in Transit Systems using Game Theory. *AI Magazine* 33(4): 59–72.

29. Othman, A. and Sandholm, T. 2011. Inventory-Based versus Prior-Based Options Trading Agents. *Algorithmic Finance* 1:95–121.

30. Conitzer, V. and Sandholm, T. 2011. Expressive Markets for Donating to Charities. *Artificial Intelligence* 175(7–8): 1251–1271, special issue on Representing, Processing, and Learning Preferences: Theoretical and Practical Challenges.

31. Gilpin, A. and Sandholm, T. 2011. Information-Theoretic Approaches to Branching in Search. *Discrete Optimization* 8(2): 147–159.

32. Sandholm, T. 2010. The State of Solving Large Incomplete-Information Games, and Application to Poker. *AI Magazine*, special issue on Algorithmic Game Theory, Winter, 13–32.

33. Benisch, M., Davis, G., and Sandholm, T. 2010. Algorithms for Closed Under Rational Behavior (CURB) Sets. *Journal of Artificial Intelligence Research (JAIR)* 38: 513–534.

34. Woodle, S., Daller, J., Aeder M., Shapiro, R., Sandholm, T., Casingal, V., Goldfarb, D., Lewis, R., Goebel, J., and Siegler, M. 2010. Ethical Considerations for Participation of Nondirected Living Donors in Kidney Exchange Programs. *American Journal of Transplantation (AJT)* 10: 1460–1467.

35. Hoda, S., Gilpin, A., Peña, J., and Sandholm, T. 2010. Smoothing techniques for computing Nash equilibria of sequential games. *Mathematics of Operations Research* 35(2), 494–512.

36. Rees, M., Kopke, J., Pelletier, R., Segev, D., Rutter, M., Fabrega, A., Rogers, J., Pankewycz, O., Hiller, J., Roth, A., Sandholm, T., Ünver, U., and Montgomery, R. 2009. A Nonsimultaneous, Extended, Altruistic-Donor Chain. *New England Journal of Medicine* 360(11): 1096-1101.

37. Conitzer, V., and Sandholm, T. 2008. New Complexity Results about Nash Equilibria. *Games and Economic Behavior* 63(2): 621–641.

38. Brandt, F. and Sandholm, T. 2008. On the Existence of Unconditionally Privacy-Preserving Auctions Protocols. *ACM Transactions on Information and System Security* 11(2), Article 10, 21 pages, May.

39. Gilpin, A. and Sandholm, T. 2007. Lossless Abstraction of Imperfect Information Games. *Journal of the ACM* 54(5).

40. Conitzer, V., Sandholm, T., and Lang, J. 2007. When Are Elections with Few Candidates Hard to Manipulate? *Journal of the ACM* 54(3): 33 pages.

41. Sandholm, T. 2007. Expressive Commerce and Its Application to Sourcing: How We Conducted $35 Billion of Generalized Combinatorial Auctions. *AI Magazine* 28(3): 45–58, Fall.

42. Sandholm, T. 2007. Perspectives on Multiagent Learning. *Artificial Intelligence.* 171: 382–391. Special issue on Foundations of Multi-Agent Learning.

43. Conitzer, V. and Sandholm, T. 2007. AWESOME: A General Multiagent Learning Algorithm that Converges in Self-Play and Learns a Best Response Against Stationary Opponents. *Machine Learning* 67: 23–42. Special issue on Learning and Computational Game Theory.

44. Blum, A., Sandholm, T., and Zinkevich, M. 2006. Online Algorithms for Market Clearing. *Journal of the ACM* 53(5): 845–879.

45. Conitzer, V. and Sandholm, T. 2006. Complexity of Constructing Solutions in the Core Based on Synergies among Coalitions. *Artificial Intelligence* 170: 607–619.

46. Sandholm, T. and Suri, S. 2006. Side Constraints and Non-Price Attributes in Markets. *Games and Economic Behavior*, 55: 321–330, Note. Special issue on Computing and Markets.

47. Sandholm, T., Levine, D., Concordia, M., Martyn, P., Hughes, R., Jacobs, J., and Begg, D. 2006. Changing the Game in Strategic Sourcing at Procter & Gamble: Expressive Competition Enabled by Optimization. (For the Franz Edelman Award submission by Procter & Gamble and CombineNet.) *Interfaces* 36(1), 55–68. Special issue on the 2005 Edelman award competition.

48. Yokoo, M., Conitzer, V., Sandholm, T., Ohta, N., and Iwasaki, A. 2006. Coalitional Games in Open Anonymous Environments. (In Japanese.) *Journal of Information Processing Society of Japan*, Vol. 47, No. 5, 1451–1462.

49. Sandholm, T., Suri, S., Gilpin, A., and Levine, D. 2005. CABOB: A Fast Optimal Algorithm for Combinatorial Auctions. *Management Science* 51(3), 374–390, special issue on Electronic Markets.

50. Blum, A., Jackson, J., Sandholm, T., and Zinkevich, M. 2004. Preference Elicitation and Query Learning. *Journal of Machine Learning Research (JMLR)* 5: 649–667. Special topic on Learning Theory.

51. Sandholm, T. and Suri, S. 2003. BOB: Improved Winner Determination in Combinatorial Auctions and Generalizations. *Artificial Intelligence*, 145, 33–58.

52. Suri, S., Sandholm, T. and Warkhede, P. 2003. Compressing 2-Dimensional Routing Tables. *Algorithmica*, 35 (4): 287–300.

53. Sandholm, T. and Zhou, Y. 2002. Surplus Equivalence of Leveled Commitment Contracts. *Artificial Intelligence*, 142, 239–264.

54. Sandholm, T. 2002. *eMediator*: A Next Generation Electronic Commerce Server. *Computational Intelligence*, 18 (4): 656–676, Special Issue on Agent Technologies for Electronic Commerce.

55. Braynov, S. and Sandholm, T. 2002. The Impact of Trust on Multiagent Negotiation. *Computational Intelligence*, 18 (4), 501–514, Special issue on Agent Technology for Electronic Commerce.

56. Sandholm, T. and Lesser, V. 2002. Leveled Commitment Contracting: A Backtracking Instrument for Multiagent Systems. *AI Magazine* 23 (3): 89–100. Special Issue on Mechanism Design.

57. Sandholm, T. 2002. Algorithm for Optimal Winner Determination in Combinatorial Auctions. *Artificial Intelligence*, 135, 1–54.

58. Larson, K. and Sandholm, T. 2001. Bargaining in Computationally Complex Problems: Deliberation Equilibrium. *Artificial Intelligence*, 132(2), 183–217.

59. Sandholm, T. and Lesser, V. 2001. Leveled Commitment Contracts and Strategic Breach. *Games and Economic Behavior*, 35, 212–270 (#1 journal in game theory). Special issue on AI and Economics.

60. Andersson, M. and Sandholm, T. 2001. Leveled Commitment Contracts with Myopic and Strategic Agents. *Journal of Economic Dynamics and Control*, 25, 615–640. Special issue on Agent-Based Computational Economics, invited submission, reviewed.

61. Sandholm, T. 2000. Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation. *Autonomous Agents and Multi-Agent Systems*, 3(1), 73–96. Special Issue on Best of ICMAS-98, invited submission, reviewed.

62. Sandholm, T. 2000. Approaches to Winner Determination in Combinatorial Auctions. *Decision Support Systems*, 28(1-2), 165–176.

63. Sandholm, T. 2000. Issues in Computational Vickrey Auctions. *International Journal of Electronic Commerce*, 4(3), 107–129. Special issue on Intelligent Agents for Electronic Commerce.

64. Larson, K. and Sandholm, T. 2000. Anytime Coalition Structure Generation: An Average Case Study. *Journal of Experimental and Theoretical AI*, 12, 23–42.

65. Sandholm, T. and Huai, Q. 2000. *Nomad*: Mobile Agent System for an Internet-Based Auction House. *IEEE Internet Computing*, 4(2), 80–86, Mar/Apr, Special issue on Agent Technology and the Internet.

66. Sandholm, T. 2000. Automated Contracting in Distributed Manufacturing among Independent Companies. *Intelligent Manufacturing*, 11(3), 273–286, Special issue on Distributed Manufacturing Systems.

67. Sandholm, T., Larson, K., Andersson, M., Shehory, O., and Tohmé, F. 1999. Coalition Structure Generation with Worst Case Guarantees. *Artificial Intelligence*, 111(1-2), 209–238.

68. Sandholm, T. 1999. Automated Negotiation. *Communications of the ACM* 42(3), 84–85. Special issue on Agents in E-commerce.

69. Tohmé, F. and Sandholm, T. 1999. Coalition Formation Processes with Belief Revision among Bounded Rational Self-Interested Agents. *Journal of Logic and Computation*, 9(6), 793–815.

70. Sandholm, T. and Lesser, V. 1997. Coalitions among Computationally Bounded Agents. *Artificial Intelligence*, 94(1), 99–137, Special issue on Economic Principles of Multiagent Systems.

71. Sandholm, T. 1997. Unenforced E-commerce Transactions. *IEEE Internet Computing*, 1(6), 47–54, Nov–Dec, Special issue on Electronic Commerce.

72. Sandholm, T. and Crites, R. 1996. Multiagent Reinforcement Learning in the Iterated Prisoner's Dilemma. *BioSystems*, 37:147-166, Special issue on the Prisoner's Dilemma.

REFEREED CONFERENCES AND REFEREED WORKSHOPS

1. Anagnostides, I., Farina, G., Sandholm, T., and Zhang, Brian Hu. 2026. A Polynomial-Time Algorithm for Variational Inequalities under the Minty Condition. *Annual Symposium on Foundations of Computer Science (FOCS).*

2. Zhang, Brian Hu, Anagnostides, I., and Sandholm, T. 2026. Scale-Invariant Regret Matching and Online Learning with Optimal Convergence: Bridging Theory and Practice in Zero-Sum Games. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 26.0%.)

3. Anagnostides, I., Balcan, M-F., Fragkia, K., Sandholm, T., Tewolde, E., and Zhang, Brian Hu. 2026. The Complexity of Equilibrium Refinements in Potential Games. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 26.0%.)

4. Zhang, Brian Hu, Anagnostides, I., Fragkia, K., Balcan, M-F., and Sandholm, T. 2026. The Complexity of Proper Equilibrium in Extensive-Form and Polytope Games. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 26.0%.)

5. Anagnostides, I., Zilberstein, I., Sollie, Z., Kilic, A., and Sandholm, T. 2026. Position: Machine Learning for Heart Transplant Allocation Policy Optimization Should Account for Incentives. *International Conference on Machine Learning (ICML).* (Acceptance rate in position paper track 29%.) Further accepted to the position paper Spotlight track, acceptance rate 5%.

6. Anagnostides, I., Panageas, I., Patris, N., and Sandholm, T. 2026. (Doubly) Exponential Lower Bounds for Follow the Regularized Leader in Potential Games. *International Conference on Machine Learning (ICML).* (Acceptance rate 26.6%.) Further accepted to the Spotlight track, acceptance rate 2.2%.

7. Zilberstein, I., Anagnostides, I., Sollie, Z., Kilic, A., and Sandholm, T. 2026. Near-Optimal Dynamic Matching via Coarsening with Application to Heart Transplantation. *International Conference on Machine Learning (ICML).* (Acceptance rate 26.6%.)

8. Anagnostides, I., Chauhan, R., Panageas, I., Sandholm, T., and Yan, J. 2026. On the Computational Complexity of Performative Prediction. *International Conference on Machine Learning (ICML).* (Acceptance rate 26.6%.)

9. Kubicek, O, Lisy, V., and Sandholm, T. 2026. Equilibrium Refinements Improve Subgame Solving in Imperfect-Information Games. *International Joint Conference on Artificial Intelligence (IJCAI).*

10. Zhang, B. and Sandholm, T. 2026. General search techniques without common knowledge for imperfect-information games, and application to superhuman Fog of War chess. *International Conference on Learning Representations (ICLR).* (Acceptance rate 28%.)

11. Anagnostides, I., Tewolde, E., Zhang, B., Panageas, B., Conitzer, V., and Sandholm, T. 2026. Convergence of Regret Matching in Potential Games and Constrained Optimization. *International Conference on Learning Representations (ICLR).* (Acceptance rate 28%.)

12. Zhang, B., Lin, T., Chen, Y., and Sandholm, T. 2026. Learning a Game by Paying the Agents. *International Conference on Learning Representations (ICLR).* (Acceptance rate 28%.)

13. Prasad, S., Balcan, M-F., and Sandholm, T. 2026. Weakest Bidder Types and New Core-Selecting Combinatorial Auctions. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 17.6%.) Further accepted for Oral Presentation.

14. Zhang, N., McAleer, S., and Sandholm, T. 2026. Faster Game Solving via Hyperparameter Schedules. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 17.6%.)

15. Martin, C. and Sandholm, T. 2026. Incremental Multiple Oracle. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS).* (Extended abstract, acceptance rate for full papers and extended abstracts combined 40%.)

16. Pieroth, F., and Sandholm, T. 2026. Verifying Approximate Equilibrium in Auctions. Econometric Society Interdisciplinary Frontiers (ESIF) conference on Economics and AI+ML (ESIFAIML). (Acceptance rate 33%.)

17. Anagnostides, I., Sollie, Z., Kilic, A., and Sandholm, T. 2026. Policy Optimization for Dynamic Heart Transplant Allocation. Econometric Society Interdisciplinary Frontiers (ESIF) conference on Economics and AI+ML (ESIFAIML). (Acceptance rate 33%.)

18. Zhang, B, Anagnostides, I., and Sandholm, T. 2026. Scale-Invariant Regret Matching and Online Learning with Optimal Convergence: Bridging Theory and Practice in Zero-Sum Games. Econometric Society Interdisciplinary Frontiers (ESIF) conference on Economics and AI+ML (ESIFAIML). (Acceptance rate 33%.)

19. Anagnostides, I., Zilberstein, I., Sollie, Z., Kilic, A., and Sandholm, T. 2026. Position: Machine Learning for Heart Transplant Allocation Policy Optimization Should Account for Incentives. Econometric Society Interdisciplinary Frontiers (ESIF) conference on Economics and AI+ML (ESIFAIML). (Acceptance rate 33%.)

20. Zhang, B., Lin, T., Chen, Y., and Sandholm, T. 2026. Learning a Game by Paying the Agents. *Workshop on Online Learning and Economics (OLE) at the ACM Conference on Economics and Computation (EC).*

21. Zhang, B, Anagnostides, I., and Sandholm, T. 2026. Scale-Invariant Regret Matching and Online Learning with Optimal Convergence: Bridging Theory and Practice in Zero-Sum Games. *Workshop on Online Learning and Economics (OLE) at the ACM Conference on Economics and Computation (EC).*

22. Zhang, B., Lin, T., Chen, Y., and Sandholm, T. 2026. Learning a Game by Paying the Agents. *Easy Peasy Workshop at the ACM Conference on Economics and Computation (EC).*

23. Tewolde, E., Zhang, B., Anagnostides, I., Sandholm, T., and Conitzer, V. 2026. Decision Making under Imperfect Recall: Algorithms and Benchmarks. *AI for Mechanism Design and Strategic Decision Making (AIMS)* workshop at the at the *International Conference on Learning Representations (ICLR).* Further selected for Oral Presentation.

24. Kubicek, O, Lisy, V., and Sandholm, T. 2026. Safe Test-Time Reinforcement learning for Imperfect Information Games. Workshop on *Multi-Agent Learning and Its Opportunities in the Era of Generative AI (MALGAI)* at the *International Conference on Learning Representations (ICLR).*

25. Anagnostides, I., Panageas, I., Sandholm, T., and Yan, J. 2025. The Complexity of Symmetric Equilibria in Min-Max Optimization and Team Zero-Sum Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Spotlight, acceptance rate 3.2%.)

26. Tewolde, E., Zhang, B., Anagnostides, I., Sandholm, T., and Conitzer, V. 2025. Decision Making under Imperfect Recall: Algorithms and Benchmarks. *The 1st Workshop on Safe AI* at the *Conference on Uncertainty in AI (UAI).*

27. Berker, E., Tewolde, E., Anagnostides, I., Sandholm, T., and Conitzer, V. 2025. The Value of Recall in Extensive-Form Games. *The 1st Workshop on Safe AI* at the *Conference on Uncertainty in AI (UAI).*

28. Zhang, B., Anagnostides, I., Tewolde, E., Berker, RE., Farina, G., Conitzer, V., and Sandholm, T. 2025. Learning and Computation of Φ-Equilibria at the Frontier of Tractability. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 22.2%.)

29. Zhang, B., Anagnostides, I., Tewolde, E., Berker, RE., Farina, G., Conitzer, V., and Sandholm, T. 2025. Expected Variational Inequalities. *International Conference on Machine Learning (ICML).* (Acceptance rate 26.9%.) Further accepted to the Spotlight Posters track, acceptance rate 2.6%. Further accepted for an Oral Presentation, acceptance rate 1%.

30. Prasad, S., Vitercik, E., Balcan, N., and Sandholm, T. 2025. New Sequence-Independent Lifting Techniques for Cover Inequalities and When They Induce Facets. *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 19.3%.)

31. Martin, C. and Sandholm, T. 2025. Joint-Perturbation Simultaneous Pseudo-Gradient. *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 19.3%.)

32. Martin, C. and Sandholm, T. 2025. ApproxED: Approximate Exploitability Descent via Learned Best Responses. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS).* (Full paper, acceptance rate 24.5%.)

33. Martin, C. and Sandholm, T. 2025. AlphaZeroES: Direct Score Maximization Outperforms Planning Loss Minimization. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS).* (Extended abstract, acceptance rate for full papers and extended abstracts combined 40%.)

34. Anagnostides, I., Kalavasis, A., and Sandholm, T. 2025. Computational Lower Bounds for No-Regret Learning in Normal-Form Games. *ACM Symposium on Theory of Computing (STOC).* (Acceptance rate 29.7%.)

35. Berker, E., Tewolde, E., Anagnostides, I., Sandholm, T., and Conitzer, V. 2025. The Value of Recall in Extensive-Form Games. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 22.9%.)

36. Tewolde, E., Zhang, B., Oesterheld, C., Sandholm, T., and Conitzer, V. 2025. Computing Game Symmetries and Equilibria That Respect Them. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 22.9%.) Further accepted for Oral Presentation. And recipient of the Best Poster Award.

37. Balcan, N., Prasad, S., and Sandholm, T. 2025. Increasing Revenue in Efficient Combinatorial Auctions by Learning to Generate Artificial Competition. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 22.9%.)

38. Taguelmimt, R., Aknine, S., Boukredera, D., Changder, N., and Sandholm, T. 2025. A Multiagent Path Search Algorithm for Large-Scale Coalition Structure Generation. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 22.9%.)

39. Anagnostides, I., Sollie, Z., Kilic, A., and Sandholm, T. 2025. Policy Optimization for Dynamic Heart Transplant Allocation. *American Heart Association's Scientific Sessions (AHA).*

40. Anagnostides, I., Sollie, Z., Kilic, A., and Sandholm, T. 2025. Machine Learning for Predicting Offer Acceptance in Heart Transplantation. *The International Society for Heart and Lung Transplantation (ISHLT) 45th Annual Meeting & Scientific Sessions.*

41. Berker, E., Tewolde, E., Anagnostides, I., Sandholm, T., and Conitzer, V. 2025. The Value of Recall in Extensive-Form Games. Reviewed poster at the *ACM Conference on Economics and Computation (EC).*

42. Kim, S., Sollie, Z., Welch, B., Ford, D., Sandholm, T., Padman, R., and Kilic, A. 2025. The Potential Use of Artificial Intelligence in Heart Transplantation Decision-Making and Allocation: A Nationwide Survey of Transplant Directors. *MUSC Department of Surgery Research Day 2025*; 24 October 2025, Charleston SC. Reviewed poster Presentation.

43. Anagnostides, I. and Sandholm, T. 2024. Convergence of $\log(1/\epsilon)$ for Gradient-Based Algorithms in Zero-Sum Games without the Condition Number: A Smoothed Analysis. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.8%.)

44. Zhang, B., Anagnostides, I., Farina, G., and Sandholm, T. 2024. Efficient Φ-Regret Minimization with Low-Degree Swap Deviations in Extensive-Form Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.8%.)

45. Zhang, B., Farina, G., Anagostides, I., Cacciamani, F., McAleer, S., Haupt, A., Celli, A., Gatti, N., Conitzer, V., and Sandholm, T. 2024. Steering No-Regret Learners to a Desired Equilibrium. *ACM Conference on Economics and Computation (EC).* Also a reviewed publication (without proceedings) in the 2024 Econometric Society Interdisciplinary Frontiers (ESIF) *Economics and AI+ML Meeting*, 2024.

46. Carminati, L., Zhang, B., Farina, G., Gatti, N., and Sandholm, T. 2024. Hidden-Role Games: Equilibrium Concepts and Computation. *ACM Conference on Economics and Computation (EC).*

47. Zhang, B. and Sandholm, T. 2024. Exponential Lower Bounds on the Double Oracle Algorithm in Zero-Sum Games. *International Joint Conference on Artificial Intelligence (IJCAI).*

48. Tewolde, E., Zhang, B., Oesterheld, C., Zampetakis, M., Sandholm, T., Goldberg, P., and Conitzer, V. 2024. Imperfect-Recall Games: Equilibrium Concepts and Their Complexity. *International Joint Conference on Artificial Intelligence (IJCAI).*

49. Taguelmimt, R., Aknine, S., Boukredera, D., Changder, N., and Sandholm, T. 2024. Faster Optimal Coalition Structure Generation via Offline Coalition Selection and Graph-Based Search. *International Joint Conference on Artificial Intelligence (IJCAI).*

50. Friedrich, P., Zhang, Y., Curry, M., Dierks, L., McAleer, S., Li, S., Sandholm, T., and Seuken, S. 2024. Scalable Mechanism Design for Multi-Agent Path Finding. *International Joint Conference on Artificial Intelligence (IJCAI).*

51. Martin, C., Boutilier, C., Sandholm, T., and Meshi, O. 2024. Model-Free Preference Elicitation. *International Joint Conference on Artificial Intelligence (IJCAI).*

52. Moskovitz, T., Singh, A., Strouse, DJ., Sandholm, T., Salakhutdinov, R., Dragan, A., and McAleer, S. 2024. Confronting Reward Model Overoptimization with Constrained RLHF. *International Conference on Learning Representations (ICLR).* Spotlight paper, acceptance rate 5%.

53. Zhang, B., Farina, G., and Sandholm, T. 2024. Mediator Interpretation and Faster Learning Algorithms for Linear Correlated Equilibria in General Sequential Games. *International Conference on Learning Representations (ICLR).* (Acceptance rate 31%.)

54. McAleer, S., Lanier, JB., Wang, K., Baldi, P., Sandholm, T., and Fox, R. 2024. Toward Optimal Policy Population Growth in Two-Player Zero-Sum Games. *International Conference on Learning Representations (ICLR).* (Acceptance rate 31%.)

55. Liang, Y., Sun, Y., Zheng, R., Liu, F., Eysenbach, B., Sandholm, T., Huang, F., and McAleer, S. 2024. Game-Theoretic Robust Reinforcement Learning Handles Temporally-Coupled Perturbations. *International Conference on Learning Representations (ICLR).* (Acceptance rate 31%.)

56. Taguelmimt, R., Aknine, S., Boukredera, D., Changder, N., and Sandholm, T. 2024. Efficient Size-based Hybrid Algorithm for Optimal Coalition Structure Generation. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS).* (Extended abstract and poster, acceptance rate 47%.)

57. Taguelmimt, R., Aknine, S., Boukredera, D., Changder, N., and Sandholm, T. 2024. A Multiagent Path Search Algorithm for Large-Scale Coalition Structure Generation. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS).* (Extended abstract and poster, acceptance rate 47%.)

58. Zhang, B. and Sandholm, T. 2024. On the Outcome Equivalence of Extensive-Form and Behavioral Correlated Equilibria. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 23.75%.)

59. Curry, M., Thoma, V., Chakrabarti, D., McAleer, S., Kroer, C., Sandholm, T., He, N., and Seuken A. 2024. Automated Design of Affine Maximizer Mechanisms In Dynamic Settings. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 23.75%.)

60. Anagnostides, I., Panageas, I., Farina, G., and Sandholm, T. 2024. Optimistic Policy Gradient in Multi-Player Markov Games with a Single Controller: Convergence Beyond the Minty Property. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 23.75%.)

61. Anagnostides, I., Kalavasis, A., Sandholm, T., and Zampetakis, M. 2024. On the Complexity of Computing Sparse Equilibria and Lower Bounds for No-Regret Learning in Games. *Innovations in Theoretical Computer Science (ITCS)* conference. (Acceptance rate 37.9%.)

62. Prasad, S., Vitercik, E., Balcan, N., and Sandholm, T. 2024. New Sequence-Independent Lifting Techniques for Cutting Planes and When They Induce Facets. *Mixed Integer Programming Workshop (MIP).* Poster (all accepted contributed papers are only presented as posters). Further selected into the poster competition.

63. Tewolde, E., Zhang, B., Oesterheld, C., Zampetakis, M., Sandholm, T., Goldberg, P., and Conitzer, V. 2024. Imperfect-Recall Games: Equilibrium Concepts and Their Complexity. *Games, Agents, and Incentives Workshop (GAIW)* at the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS).*

64. Zhang, B., Farina, G., Anagnostides, I., Cacciamani, F., McAleer, S., Haupt, A., Celli, A., Gatti, N., Conitzer, V., and Sandholm, T. 2023. Computing Optimal Equilibria and Mechanisms via Learning in Zero-Sum Extensive-Form Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 26.1%.)

65. McAleer, S., Farina, G., Zhou, G., Wang, M., Yang, Y., and Sandholm, T. 2023. Team-PSRO for Learning Approximate TMECor in Large Team Games via Cooperative Reinforcement Learning. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 26.1%.)

66. Anagnostides, I., Panageas, I., Farina, G., and Sandholm, T. 2023. On the Convergence of No-Regret Learning Dynamics in Time-Varying Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 26.1%.)

67. Prasad, S., Balcan, N., and Sandholm, T. 2023. Bicriteria Multidimensional Mechanism Design with Side Information. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 26.1%.) Also a reviewed publication (without proceedings) in the 2024 Econometric Society Interdisciplinary Frontiers (ESIF) *Economics and AI+ML Meeting*, 2024.

68. Anagnostides, I. and Sandholm, T. 2023. On the Interplay between Social Welfare and Tractability of Equilibria. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 26.1%.)

69. Anagnostides, I., Farina, G., and Sandholm, T. 2023. Near-Optimal Φ-Regret Learning in Extensive-Form Games. *International Conference on Machine Learning (ICML).* (Acceptance rate 27.9%.)

70. Zhang, B., Farina, G., and Sandholm, T. 2023. Team Belief DAG: Generalizing the Sequence Form to Team Games for Fast Computation of Correlated Team Max-Min Equilibria via Regret Minimization. *International Conference on Machine Learning (ICML).* (Acceptance rate 27.9%.)

71. Martin, C. and Sandholm, T. 2023. Finding mixed-strategy equilibria of continuous-action games without gradients using randomized policy networks. *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 15%.)

72. Curry, M., Sandholm, T., and Dickerson, J. 2023. Differentiable Economics for Randomized Affine Maximizer Auctions. *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 15%.)

73. Taguelmimt, R., Aknine, S., Boukredera, D., Changder, N., and Sandholm, T. 2023. Optimal Anytime Coalition Structure Generation Utilizing Compact Solution Space Representation. *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 15%.)

74. McAleer, S., Farina, G., Lanctot, M., and Sandholm , T. 2023. ESCHER: Eschewing Importance Sampling in Games by Computing a History Value Function to Estimate Regret. *International Conference on Learning Representations (ICLR).* (Acceptance rate 31.8%.)

75. Harris, K., Anagnostides, I., Farina, G., Khodak, M., Wu, S., and Sandholm, T. 2023. Meta-Learning in Games. *International Conference on Learning Representations (ICLR).* (Acceptance rate 31.8%.)

76. Moskovitz, T., Singh, A., Strouse, DJ., Sandholm, T., Salakhutdinov, R., Dragan, A., and McAleer, S. 2023. Confronting Reward Model Overoptimization with Constrained RLHF. *Foundation Models for Decision Making Workshop* at the *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference.

77. Curry, M., Thoma, V., Chakrabarti, D., McAleer, S., Kroer, C., Sandholm, T., He, N., and Seuken A. 2023. Automated Design of Affine Maximizer Mechanisms In Dynamic Settings. *European Workshop on Reinforcement Learning (EWRL).*

78. Liang, Y., Sun, Y., Zheng, R., Liu, X., Sandholm, T., Huang, F., and McAleer, S. 2023. Adapting Robust Reinforcement Learning to Handle Temporally-Coupled Perturbations. *The Second Workshop on New Frontiers in Adversarial Machine Learning (AdvML-Frontiers)* at the *International Conference on Machine Learning (ICML).*

79. Taguelmimt, R., Aknine, S., Boukredera, D., Changder, N., and Sandholm, T. 2023. A Multiagent Path Search Algorithm for Large-Scale Coalition Structure Generation. *The 14th Workshop on Optimization and Learning in Multiagent Systems (OptLearnMAS)* at the *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS).*

80. Taguelmimt, R., Aknine, S., Boukredera, D., Changder, N., and Sandholm, T. 2023. Faster Optimal Coalition Structure Generation via Offline Coalition Selection and Graph-Based Search. *The 14th Workshop on Optimization and Learning in Multiagent Systems (OptLearnMAS)* at the *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS).*

81. Taguelmimt, R., Aknine, S., Boukredera, D., Changder, N., and Sandholm, T. 2023. Efficient Size-based Hybrid Algorithm for Optimal Coalition Structure Generation. *The 14th Workshop on Optimization and Learning in Multiagent Systems (OptLearnMAS)* at the *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS).*

82. Prasad, S., Balcan, N., and Sandholm, T. 2023. Bicriteria Multidimensional Mechanism Design with Side Information. *ACM Conference on Economics and Computation (EC).* Poster.

83. Zhang, B. and Sandholm, T. 2023. Polynomial-Time Optimal Equilibria with a Mediator in Extensive-Form Games. *ACM Conference on Economics and Computation (EC).* Poster.

84. Steering No-Regret Learners to Optimal Equilibria. 2023. *ACM Conference on Economics and Computation (EC).* Poster.

85. Prasad, S., Balcan, N., and Sandholm, T. 2023. Bicriteria Multidimensional Mechanism Design with Side Information. *Market Innovation Workshop.*

86. Curry, M., Sandholm T., and Dickerson, J. 2023. Differentiable Economics for Randomized Affine Maximizer Auctions. *Market Innovation Workshop.*

87. Anagnostides, I., Farina, G., Kroer, C., Lee, C.-W., Luo, H., and Sandholm, T. 2022. Uncoupled Learning Dynamics with $O(\log T)$ Swap Regret in Multiplayer Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.6%.) Further selected as Oral.

88. Balcan, MF., Prasad, S., Sandholm, T., Vitercik, E. 2022. Structural Analysis of Branch-and-Cut and the Learnability of Gomory Mixed Integer Cuts. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.6%.) Further selected as Oral.

89. Anagnostides, I., Farina, G., Panageas, I., and Sandholm, T. 2022. Optimistic Mirror Descent Either Converges to Nash or to Strong Coarse Correlated Equilibria in Bimatrix Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.6%.)

90. Zhang, B. and Sandholm, T. 2022. Polynomial-Time Optimal Equilibria with a Mediator in Extensive-Form Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.6%.)

91. Balcan, MF., Prasad, S., and Sandholm, T. 2022. Maximizing Revenue under Market Shrinkage and Market Uncertainty. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.6%.)

92. Farina, G., Anagnostides, I., Luo, H., Lee, C.-W., Kroer, C., and Sandholm, T. 2022. Near-Optimal No-Regret Learning Dynamics for General Convex Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.6%.)

93. Zhang, B., Carminati, L., Cacciamani, F., Farina, G., Olivieri, P., Gatti, N., and Sandholm, T. 2022. Subgame Solving in Adversarial Team Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 25.6%.)

94. Anagnostides, I., Panageas, I., Farina, G., and Sandholm, T. 2022. On Last-Iterate Convergence Beyond Zero-Sum Games. *International Conference on Machine Learning (ICML).* (Acceptance rate 21.9%.)

95. Zhang, B., Farina, G., Celli, A., and Sandholm, T. 2022. Optimal Correlated Equilibria in General-Sum Extensive-Form Games: Fixed-Parameter Algorithms, Hardness, and

Two-Sided Column-Generation. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 27%.)

96. Anagnostides, I., Farina, G., Kroer, C., Celli, A., and Sandholm, T. 2022. Faster No-Regret Learning Dynamics for Extensive-Form Correlated and Coarse Correlated Equilibria. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 27%.)

97. Balcan, N., Prasad, S., Sandholm, T., and Vitercik, E. 2022. Improved Learning Bounds for Branch-and-Cut. *International Conference on Principles and Practice of Constraint Programming (CP).*

98. Anagnostides, I., Daskalakis, C., Farina, G., Fishelson, M., Golowich, N., and Sandholm, T. 2022. Near-Optimal No-Regret Learning for Correlated Equilibria in Multi-Player General-Sum Games. *ACM Symposium on Theory of Computing (STOC).* (Acceptance rate 29%.)

99. Zhang, B. and Sandholm, T. 2022. Team Correlated Equilibria in Zero-Sum Extensive-Form Games via Tree Decompositions. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 14.6%.)

100. Farina, G. and Sandholm, T. 2022. Fast Payoff Matrix Sparsification Techniques for Structured Extensive-Form Games. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 14.6%.)

101. Gauntt, K., Toll, A., Musick, J., Kennealey, P., Kim, J., Sandholm, T., and Leishman, R. 2022. A Decennial Summary Of The OPTN Kidney Paired Donation Pilot Program. *American Transplantation Congress (ATC).* Rapid Fire Oral Abstract.

102. McAleer, S., Farina, G., Lanctot, M., and Sandholm, T. 2022. ESCHER: Eschewing Importance Sampling in Games by Computing a History Value Function to Estimate Regret. NeurIPS *Deep RL Workshop.* Further invited as *Spotlight Presentation.*

103. Zhang, B., Farina, G., and Sandholm, T. 2022. Team Belief DAG Form: A Concise Representation for Team-Correlated Game-Theoretic Decision Making. *ICLR Workshop on Gamification and Multiagent Solutions.*

104. Zhang, B., Farina, G., Celli, A., Sandholm, T., and Tacchetti, A. 2022. Optimal Correlated Equilibria in General-Sum Extensive-Form Games: Fixed-Parameter Algorithms, Hardness, and Two-Sided Column-Generation. *ICLR Workshop on Gamification and Multiagent Solutions.*

105. Zhang, B. and Sandholm, T. 2022. Subgame Solving without Common Knowledge. *AAAI Reinforcement Learning in Games (RLG) Workshop.* One of only four contributed papers that received an oral presentation slot (acceptance rate 8.3%).

106. Anagnostides, I., Farina, G., Sandholm, T., and Kroer, C. 2022. Faster No-Regret Learning Dynamics for Extensive-Form Correlated Equilibrium. *AAAI Reinforcement Learning in Games (RLG) Workshop.*

107. Farina, G., Celli, A., Gatti, N., and Sandholm, T. 2022. Connecting Optimal Ex-Ante Collusion in Teams to Extensive-Form Correlation: Faster Algorithms and Positive Complexity Results. *AAAI Reinforcement Learning in Games (RLG) Workshop.*

108. Farina, G. and Sandholm, T. 2022. Fast Payoff Matrix Sparsification Techniques for Structured Extensive-Form Games. *AAAI Reinforcement Learning in Games (RLG) Workshop.*

109. Zhang, B. and Sandholm, T. 2022. Team Correlated Equilibria in Zero-Sum Extensive-Form Games via Tree Decompositions. *AAAI Reinforcement Learning in Games (RLG) Workshop.*

110. Zhang, B. and Sandholm, T. 2021. Subgame Solving without Common Knowledge. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. Spotlight Presentation. (Acceptance rate 3%.)

111. Balcan, N., Prasad, S., Sandholm, T., and Vitercik, E. 2021. Sample Complexity of Tree Search Configuration: Cutting Planes and Beyond. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. Spotlight Presentation. (Acceptance rate 3%.)

112. Farina, G. and Sandholm, T. 2021. Equilibrium Refinement for the Age of Machines: The One-Sided Quasi-Perfect Equilibrium. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 26%.)

113. McElfresh, D., Curry, M., Sandholm, T., and Dickerson, J. 2021. Improving Policy-Constrained Kidney Exchange via Pre-Screening. *ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO)*, (submitted to the non-archival track due to having already been published in the NeurIPS conference). (Acceptance rate 28%.)

114. Farina, G. and Sandholm, T. 2021. Connecting Optimal Ex-Ante Collusion in Teams to Extensive-Form Correlation: Faster Algorithms and Positive Complexity Results. *International Conference on Machine Learning (ICML).* (Acceptance rate 21%.)

115. Farina, G., Kroer, C., and Sandholm, T. 2021. Better Regularization for Sequential Decision Spaces: Fast Convergence Rates for Nash, Correlated, and Team Equilibria. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 26%.)

116. Balcan, N., DeBlasio, D., Dick, T., Kingsford, C., Sandholm, T., and Vitercik, E. 2021. How much data is sufficient to learn high-performing algorithms? *ACM Symposium on Theory of Computing (STOC).* (Acceptance rate 28%.)

117. Balcan, N., Prasad, S., and Sandholm, T. 2021. Learning Within an Instance for Designing High-Revenue Combinatorial Auctions. *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 13.9%.)

118. Zhang, B. and Sandholm, T. 2021. Finding and Certifying (Near-)Optimal Strategies in Black-Box Extensive-Form Games. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 21.0%.)

119. Farina, G., Kroer, C., and Sandholm, T. 2021. Faster Game Solving via Predictive Blackwell Approachability: Connecting Regret Matching and Mirror Descent. 2021. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 21.0%.)

120. Farina, G., Schmucker, R., and Sandholm, T. 2021. Bandit Linear Optimization for Sequential Decision Making and Extensive-Form Games. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 21.0%.)

121. Balcan, N., Sandholm, T., and Vitercik, E. 2021. Generalization in Portfolio-Based Algorithm Selection. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 21.0%.)

122. Zhang, B. and Sandholm, T. 2021. Finding and Certifying (Near-)Optimal Strategies in Black-Box Extensive-Form Games. *Reinforcement Learning in Games (RLG) workshop at AAAI.* One of only four papers (out of 52 accepted papers) that were accepted for *Oral Presentation*.

123. Zhang, B. and Sandholm, T. 2021. Small Nash Equilibrium Certificates in Very Large Games. *Reinforcement Learning in Games (RLG) workshop at AAAI.*

124. Farina, G. and Sandholm, T. 2021. Polynomial-Time Computation of Optimal Correlated Equilibria in Two-Player Extensive-Form Games with Public Chance Moves and Beyond. *Reinforcement Learning in Games (RLG) workshop at AAAI.*

125. Farina, G., Kroer, C., and Sandholm, T. 2021. Faster Game Solving via Predictive Blackwell Approachability: Connecting Regret Matching and Mirror Descent. *Reinforcement Learning in Games (RLG) workshop at AAAI.*

126. Farina, G. and Sandholm, T. 2021. Model-Free Online Learning in Unknown Sequential Decision Making Problems and Games. *Reinforcement Learning in Games (RLG) workshop at AAAI.*

127. Martin, C. and Sandholm, T. 2021. Efficient Exploration of Zero-Sum Stochastic Games. *Reinforcement Learning in Games (RLG) workshop at AAAI.*

128. Zhang, B. and Sandholm, T. 2021. Sparsified Linear Programming for Zero-Sum Equilibrium Finding. *Reinforcement Learning in Games (RLG) workshop at AAAI.*

129. Martin, C. and Sandholm, T. 2021. Bayesian Multiagent Inverse Reinforcement Learning for Policy Recommendation. *Reinforcement Learning in Games (RLG) workshop at AAAI.*

130. Farina, G., Celli, A., Gatti, N., and Sandholm, T. 2021. Faster Algorithms for Optimal Ex-Ante Coordinated Collusive Strategies in Extensive-Form Zero-Sum Games. *Reinforcement Learning in Games (RLG) workshop at AAAI.*

131. McElfresh, D., Curry, M., Sandholm, T., and Dickerson, J. 2021. Improving Policy-Constrained Kidney Exchange via Pre-Screening. *American Transplant Congress (ATC)*, presentation and poster.

132. Booker, S., Leishman, R., Musick, J., Oley, M., Sandholm, T., and Dickerson, J., Pavlakis, M., and Casingal, V. 2021. Impact of Pre-Screening on OPTN Kidney Paired Donation Pilot Program Transplant and Refusal Rates. *American Transplant Congress (ATC)*, poster.

133. Booker, S., Leishman, R., Stewart, D., Sandholm, T., and Dickerson, J., Pavlakis, M., and Casingal, V. 2021. An Early Look at the OPTN Kidney Paired Donation Pilot Programs New Priority Points Policy. *American Transplant Congress (ATC)*, poster.

134. McElfresh, D., Curry, M., Booker, S., Stuart, M., Stewart, D., Leishman, R., Sandholm, T., and Dickerson, J. 2021. Who can be matched via kidney exchange? *American Transplant Congress (ATC)*, late-breaking poster.

135. McElfresh, D., Curry, M., Sandholm, T., and Dickerson, J. 2021. Improving Policy-Constrained Kidney Exchange via Pre-Screening. *Marketplace Innovations Workshop*, poster.

136. Zhang, B. and Sandholm, T. 2020. Small Nash Equilibrium Certificates in Very Large Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 20%.)

137. McElfresh, D., Curry, M., Sandholm, T., and Dickerson, J. 2020. Improving Policy-Constrained Kidney Exchange via Pre-Screening. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 20%.)

138. Farina, G. and Sandholm, T. 2020. Polynomial-Time Computation of Optimal Correlated Equilibria in Two-Player Extensive-Form Games with Public Chance Moves and Beyond. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 20%.)

139. Farina, G., Kroer, C., and Sandholm, T. 2020. Stochastic Regret Minimization in Extensive-Form Games. *International Conference on Machine Learning (ICML).* (Acceptance rate 22%.)

140. Zhang, B. and Sandholm, T. 2020. Sparsified Linear Programming for Zero-Sum Equilibrium Finding. *International Conference on Machine Learning (ICML).* (Acceptance rate 22%.)

141. Balcan, N., Sandholm, T., and Vitercik, E. 2020. Refined bounds for algorithm configuration: The knife-edge of dual class approximability. *International Conference on Machine Learning (ICML).* (Acceptance rate 22%.)

142. Farina, G., Bianchi, T., and Sandholm, T. 2020. Coarse Correlation in Extensive-Form Games. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 26%.)

143. Balcan, N., Sandholm, T., and Vitercik, E. 2020. Learning to Optimize Computational Resources: Frugal Training with Generalization Guarantees. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 26%.)

144. Farina, G., Schmucker, R., and Sandholm, T. 2020. Counterfactual-Free Regret Minimization for Sequential Decision Making and Extensive-Form Games. *AAAI Workshop on Reinforcement Learning in Games.* Further selected for oral presentation.

145. Farina, G., Ling, CK., Fang, F., and Sandholm, T. 2020. Correlation in Extensive-Form Games: Saddle-Point Formulation and Benchmarks. *AAAI Workshop on Reinforcement Learning in Games.*

146. Farina, G., Ling, CK., Fang, F., and Sandholm, T. 2020. Efficient Regret Minimization Algorithm for Extensive-Form Correlated Equilibrium. *AAAI Workshop on Reinforcement Learning in Games.*

147. Farina, G., Kroer, C., and Sandholm, T. 2020. Composability of Regret Minimizers. *AAAI Workshop on Reinforcement Learning in Games.*

148. Farina, G., Kroer, C., and Sandholm, T. 2020. Optimistic Regret Minimization for Extensive-Form Games via Dilated Distance-Generating Functions. *AAAI Workshop on Reinforcement Learning in Games.*

149. Farina, G., Kroer, C., Brown, N., and Sandholm, T. 2020. Stable-Predictive Optimistic Counterfactual Regret Minimization. *AAAI Workshop on Reinforcement Learning in Games.*

150. Ayers, B., Sandholm, T., Padman, R., Gosev, I., Prasad, S., and Kilic, A. 2020. Using Machine Learning to Improve Survival Prediction After Heart Transplantation. Abstract. *American Heart Association (AHA).*

151. Farina, G., Kroer, C., and Sandholm, T. 2019. Optimistic Regret Minimization for Extensive-Form Games via Dilated Distance-Generating Functions. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 22%.) Also, Spotlight Presentation, acceptance rate 2%.

152. Farina, G., Ling, CK., Fang, F., and Sandholm, T. 2019. Correlation in Extensive-Form Games: Saddle-Point Formulation and Benchmarks. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 22%.)

153. Farina, G., Ling, CK., Fang, F., and Sandholm, T. 2019. Efficient Regret Minimization Algorithm for Extensive-Form Correlated Equilibrium. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 22%.)

154. Farina, G., Kroer, C., and Sandholm, T. 2019. Compositional Calculus of Regret Minimizers. *Bridging Game Theory and Deep Learning Workshop NeurIPS, (Smooth Games Optimization and Machine Learning Series).*

155. Farina, G., Ling, CK., Fang, F., and Sandholm, T. 2019. Power of Correlation in Extensive-Form Games. *IJCAI Workshop on Strategic Reasoning*, 2019.

156. Farina, G., Kroer, C., and Sandholm, T. 2019. Optimistic Regret Minimization for Extensive-Form Games via Dilated Distance-Generating Functions. In *IJCAI Workshop on Strategic Reasoning*, 2019.

157. Farina, G., Kroer, C., and Sandholm, T. 2019. Regret Circuits: Composability of Regret Minimizers. *International Conference on Machine Learning (ICML).* (Acceptance rate 23%.) Also selected for long presentation. Extended version on arXiv.

158. Farina, G., Kroer, C., Brown, N., and Sandholm, T. 2019. Stable-Predictive Optimistic Counterfactual Regret Minimization. *International Conference on Machine Learning (ICML).* (Acceptance rate 23%.) Extended version on arXiv.

159. Brown, N., Lerer, A., Gross, S., and Sandholm, T. 2019. Deep Counterfactual Regret Minimization. *International Conference on Machine Learning (ICML).* (Acceptance rate 23%.)

160. Balcan, N., Sandholm, T., and Vitercik, E. 2019. Estimating Approximate Incentive Compatibility. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 28%.) Won the Exemplary AI Track Paper Award. Won the Best Presentation by a Student or Postdoctoral Researcher Award. Invited to the *ACM Transactions on Economics and Computation (TEAC)* Special Issue on Best of EC-19.

161. Balcan, N., Sandholm, T., and Vitercik, E. 2019. A general theory of sample complexity for multi-item profit maximization. *ACM/INFORMS Workshop on Market Design at the Conference on Economics and Computation (EC).*

162. Balcan, N., Sandholm, T., and Vitercik, E. 2019. Estimating Approximate Incentive Compatibility. *EC Workshop on Machine Learning in the Presence of Strategic Behavior.*

163. Farina, G., Marchesi, A., Kroer, C., Gatti, N., and Sandholm, T. 2019. Trembling-Hand Perfection in Stackelberg Sequential Games. *AAMAS Workshop on Games, Agents and Incentives Workshops (GAIW).*

164. Marchesi, A., Farina, G., Kroer, C., Gatti, N., and Sandholm, T. 2019. Computing a Quasi-Perfect Stackelberg Equilibrium. *AAMAS Workshop on Games, Agents and Incentives Workshops (GAIW).*

165. Brown, N. and Sandholm, T. 2019. Solving Imperfect-Information Games with Discounted Counterfactual Regret Minimization. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 16%. Further accepted for oral presentation.) Won the Distinguished Paper Honorable Mention.

166. Marchesi, A., Farina, G., Kroer, C., Gatti, N., and Sandholm, T. 2019. Quasi-Perfect Stackelberg Equilibrium. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 16%. Further accepted for oral presentation.)

167. Farina, G., Kroer, C., and Sandholm, T. 2019. Online Convex Optimization for Sequential Decision Processes and Extensive-Form Games. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 16%.)

168. Brown, N. and Sandholm, T. 2019. Solving Imperfect-Information Games via Discounted Regret Minimization. *AAAI Workshop on Reinforcement Learning in Games.*

169. Kroer, C., Farina, G., and Sandholm, T. 2019. Solving Large Sequential Games with the Excessive Gap Technique. *AAAI Workshop on Reinforcement Learning in Games.*

170. Farina, G., Kroer, C., and Sandholm, T. 2019. Online Convex Optimization for Sequential Decision Processes and Extensive-Form Games. *AAAI Workshop on Reinforcement Learning in Games.*

171. Farina, G., Celli, A., Gatti, N., and Sandholm, T. 2019. Ex ante coordination in team games. *AAAI Workshop on Reinforcement Learning in Games.*

172. Brown, N., Sandholm, T., and Amos, B. 2019. Depth-Limited Solving for Imperfect-Information Games. *AAAI Workshop on Reinforcement Learning in Games.*

173. Marchesi, A., Farina, G., Kroer, C., Gatti, N., and Sandholm, T. 2019. Quasi-Perfect Stackelberg Equilibrium. *AAAI Workshop on Reinforcement Learning in Games.*

174. Brown, N., Lerer, A., Gross, S., and Sandholm, T. 2019. Deep Counterfactual Regret Minimization. *AAAI Workshop on Reinforcement Learning in Games.*

175. Farina, G., Kroer, C., and Sandholm, T. 2019. Composability of Regret Minimizers. *AAAI Workshop on Reinforcement Learning in Games.*

176. Farina, G., Gatti, N., and Sandholm, T. 2019. Practical exact algorithm for trembling-hand equilibrium refinements in games. *AAAI Workshop on Reinforcement Learning in Games.*

177. Kroer, C., Farina, G., and Sandholm, T. 2018. Solving Large Sequential Games with the Excessive Gap Technique. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 21%.) Further selected to be a Spotlight, acceptance rate 3%.

178. Farina, G., Celli, A., Gatti, N., and Sandholm, T. 2018. Ex ante coordination and collusion in zero-sum multi-player extensive-form games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 21%.)

179. Farina, G., Gatti, N., and Sandholm, T. 2018. Practical exact algorithm for trembling-hand equilibrium refinements in games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 21%.)

180. Brown, N., Amos, B., and Sandholm, T. 2018. Depth-Limited Solving for Imperfect-Information Games. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 21%.)

181. Kroer, C. and Sandholm, T. 2018. A Unified Framework for Extensive-Form Game Abstraction with Bounds. *Neural Information Processing Systems: Natural and Synthetic (NeurIPS)* conference. (Acceptance rate 21%.)

182. Brown, N., Lerer, A., Gross, S., and Sandholm, T. 2018. Deep Counterfactual Regret Minimization. *NeurIPS Deep Reinforcement Learning Workshop.* Further selected into the Oral Presentation track.

183. Farina, G., Kroer, C., and Sandholm, T. 2018. Regret Decomposition in Sequential Games with Convex Action Spaces and Losses. *Smooth Games Optimization and Machine Learning Workshop at NeurIPS.* Further selected to have an Oral Presentation.

184. Balcan, N., Dick, T., Sandholm, T., and Vitercik, E. 2018. Learning to Branch. *International Conference on Machine Learning (ICML).* (Acceptance rate 25%. After that, this paper was further selected to the Oral Track.)

185. Farina, G., Marchesi, A., Kroer, C., Gatti, N., and Sandholm, T. 2018. Trembling-Hand Perfection in Extensive-Form Games with Commitment. *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 20%. All papers were presented both orally and as posters.)

186. Balcan, N., Sandholm, T., and Vitercik, E. 2018. A general theory of sample complexity for multi-item profit maximization. *AAMAS-IJCAI Workshop on Agents and Incentives in Artificial Intelligence (AIˆ 3).*

187. Farina, G., Gatti, N., and Sandholm, T. 2018. Practical exact algorithm for trembling-hand equilibrium refinements in games. *AAMAS-IJCAI Workshop on Agents and Incentives in Artificial Intelligence (AIˆ 3).*

188. Kroer, C. and Sandholm, T. 2018. A Unified Framework for Extensive-Form Game Abstraction with Bounds. *AAMAS-IJCAI Workshop on Agents and Incentives in Artificial Intelligence (AIˆ 3).*

189. Balcan, N., Sandholm, T., and Vitercik, E. 2018. A general theory of sample complexity for multi-item profit maximization. *ACM Conference on Economics and Computation (EC).* (Acceptance rate 26%.)

190. Kroer, C., Farina, G., and Sandholm, T. 2018. Robust Stackelberg Equilibria in Extensive-Form Games and Extension to Limited Lookahead. *AAAI Conference on Artificial Intelligence (AAAI).* (Acceptance rate 25%. After that, this paper was further accepted to the oral track.)

191. Kroer, C., Farina, G., and Sandholm, T. 2018. Robust Stackelberg Equilibria in Extensive-Form Games and Extension to Limited Lookahead. *AAAI-18 Workshop on AI for Imperfect-Information Games.*

192. Toll, A., Leishman, R., Casingal, V., Aeder, M., Sandholm, T., and Turgeon, N. Early Considerations for Deceased Donor Chains. *American Transplant Congress (ATC)*, 2018. Also selected for Oral Presentation.

193. Toll, A., Leishman, R., Casingal, V., Aeder, M., Sandholm, T., and Turgeon, N. What Deceased Donors Do KPD Candidates Accept? *American Transplant Congress (ATC)*, 2018. Also selected for Oral Presentation.

194. Brown, N. and Sandholm, T. 2017. Safe and Nested Subgame Solving for Imperfect-Information Games. *Neural Information Processing Systems: Natural and Synthetic (NIPS)* conference. Oral track, acceptance rate 1.2%. Furthermore, won a best paper award (one of three).

195. Brown, N., Kroer, C., and Sandholm, T. 2017. Reduced Space and Faster Convergence in Imperfect-Information Games via Pruning. *International Conference on Machine Learning (ICML)*. (Acceptance rate 25%.) All papers at ICML-17 were both oral and poster.

196. Farina, G., Kroer, C., and Sandholm, T. 2017. Regret Minimization in Behaviorally-Constrained Zero-Sum Games. *International Conference on Machine Learning (ICML)*. (Acceptance rate 25%.) All papers at ICML-17 were both oral and poster.

197. Kroer, C., Farina, G., and Sandholm, T. 2017. Smoothing Method for Approximate Extensive-Form Perfect Equilibrium. *International Joint Conference on Artificial Intelligence (IJCAI)*. (Acceptance rate 26%.)

198. Farina, G., Dickerson J., and Sandholm, T. 2017. Operation Frames and Clubs in Kidney Exchange. *International Joint Conference on Artificial Intelligence (IJCAI)*. (Acceptance rate 26%.)

199. Kroer, C., Waugh, K., Kilinç-Karzan, F., and Sandholm, T. 2017. Theoretical and Practical Advances on Smoothing for Extensive-Form Games. *ACM Conference on Economics and Computation (EC)*.

200. Dickerson, J., Kazachkov, A., Procaccia, A., and Sandholm, T. 2017. Small Representations of Big Kidney Exchange Graphs. In Proceedings of the AAAI Conference on Artificial Intelligence (AAAI). (Acceptance rate 25%.) Further accepted to the oral presentation track.

201. Brown, N., Kroer, C., and Sandholm, T. 2017. Dynamic Thresholding and Pruning for Regret Minimization. In Proceedings of the AAAI Conference on Artificial Intelligence (AAAI). (Acceptance rate 25%.)

202. Berg, K. and Sandholm, T. 2017. Exclusion Method for Finding Nash Equilibrium in Multiplayer Games. In Proceedings of the AAAI Conference on Artificial Intelligence (AAAI). (Acceptance rate 25%.)

203. Leishman, R., Aeder, M., Harper, A., Leffell, MS., Murphey, C., Reinsmoen, N., Saidman, S., Sandholm, T., Toll, A., and Turgen, N. 2017. Effects of New KPD Histocompatibility Policy on Refusal Rate and Transplants. Oral presentation. Session: Health Services and Policy in Organ Transplantation. *American Transplant Congress (ATC)*.

204. Sandholm, T., Farina, G., Dickerson, J., Leishman, R., Stewart, D., Formica, R., Thiessen, C., and Kulkarni, S. 2017. A Novel KPD Mechanism to Increase Transplants When Some Candidates Have Multiple Willing Donors. Poster presentation. In Session D: Non-Organ Specific: Economics, Public Policy, Allocation, Ethics. *American Transplant Congress (ATC).*

205. Balcan, N., Sandholm, T., and Vitercik, E. 2017. Sample Complexity of Multi-Item Profit Maximization. *Workshop on Algorithmic Game Theory and Data Science* at the *ACM Conference on Economics and Computation (EC).*

206. Farina, G., Dickerson J., and Sandholm, T. 2017. Multiple Willing Donors and Organ Clubs in Kidney Exchange. *Algorithmic Game Theory (AGT) workshop* at the *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 57%.)

207. Farina, G., Kroer, C., and Sandholm, T. 2017. Regret Minimization in Behaviorally-Constrained Zero-Sum Games. *Algorithmic Game Theory (AGT) workshop* at the *International Joint Conference on Artificial Intelligence (IJCAI).* (Acceptance rate 57%.)

208. Farina, G., Dickerson, J., and Sandholm, T. 2017. Inter-Club Kidney Exchange. AAAI-17 Workshop on AI and OR for Social Good (AIORSocGood-17).

209. Dickerson, J., Kazachkov, A., Procaccia, A., and Sandholm, T. 2017. Small Representations of Big Kidney Exchange Graphs. AAAI-17 Workshop on AI and OR for Social Good (AIORSocGood-17).

210. Brown, N. and Sandholm, T. 2017. Safe and Nested Endgame Solving for Imperfect-Information Games. In Proceedings of the *AAAI workshop on Computer Poker and Imperfect Information Games.*

211. Brown, N. and Sandholm, T. 2017. Reduced Space and Faster Convergence in Imperfect-Information Games via Regret-Based Pruning. In Proceedings of the *AAAI workshop on Computer Poker and Imperfect Information Games.*

212. Balcan, N., Sandholm, T., and Vitercik, E. 2016. Sample Complexity of Automated Mechanism Design. In Proceedings of the Conference on Neural Information Processing Systems (NIPS), Barcelona, Spain. (Acceptance rate 23%.) Earlier version: http://arxiv.org/abs/ 1606.04145.

213. Nath, S. and Sandholm, T. 2016. Efficiency and Budget Balance. In Proceedings of the Conference on Web and Internet Economics (WINE), Montreal, Canada.

214. Dickerson, J., Manlove, D., Plaut, B., Sandholm, T., and Trimble J. 2016. Position-Indexed Formulations for Kidney Exchange. *ACM Conference on Economics and Computation (EC)*, Maastricht, Netherlands. (Acceptance rate 33%.)

215. Kroer, C. and Sandholm, T. 2016. Imperfect-Recall Abstractions with Bounds in Games. *ACM Conference on Economics and Computation (EC)*, Maastricht, Netherlands. (Acceptance rate 33%.)

216. Kroer, C. and Sandholm, T. 2016. Sequential Planning for Steering Immune System Adaptation. *International Joint Conference on Artificial Intelligence (IJCAI)*, New York, NY. (Acceptance rate 25%.)

217. Peng, F. and Sandholm, T. 2016. Scalable Segment Abstraction Method for Advertising Campaign Admission and Inventory Allocation Optimization. *International Joint Conference on Artificial Intelligence (IJCAI)*, New York, NY. (Acceptance rate 25%.)

218. Plaut, B., Dickerson, J., and Sandholm, T. 2016. Fast Optimal Clearing of Capped-Chain Barter Exchanges. *AAAI Conference on Artificial Intelligence (AAAI)*, Phoenix, AZ. (Acceptance rate 26%. Beyond that selection, this paper was selected for the oral track.)

219. Brown, N. and Sandholm, T. 2016. Strategy-Based Warm Starting for Regret Minimization in Games. *AAAI Conference on Artificial Intelligence (AAAI)*, Phoenix, AZ. (Acceptance rate 26%.) Also accepted for presentation at the Workshop on Computer Poker and Imperfect Information Games at the conference.

220. Nguyen, T. and Sandholm, T. 2016. Multi-Option Descending Clock Auction. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, extended abstract, Singapore. (Acceptance rate 49%.)

221. Berg, K. and Sandholm, T. 2016. Exclusion Method for Finding Nash Equilibrium in Multi-Player Games. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, extended abstract, Singapore. (Acceptance rate 49%.)

222. Brown, N. and Sandholm, T. 2016. Simultaneous Abstraction and Equilibrium Finding in Games. *International Congress of the Game Theory Society (GAMES)*, Maastricht, Netherlands. (Further accepted to the oral track.)

223. Dickerson, J. and Sandholm, T. 2016. FutureMatch: Combining Human Value Judgments and Machine Learning to Match in Dynamic Environments. *International Congress of the Game Theory Society (GAMES)*, Maastricht, Netherlands. (Further accepted to the oral track.)

224. Berg, K. and Sandholm, T. 2016. Exclusion Method for Finding Nash Equilibrium in Multi-Player Games. *International Congress of the Game Theory Society (GAMES)*, Maastricht, Netherlands. (Further accepted to the oral track.)

225. Brown, N., Kroer, C., and Sandholm, T. Dynamic Thresholding and Pruning for Regret Minimization. *Workshop on Algorithmic Game Theory (AGT)* at the *International Joint Conference on Artificial Intelligence (IJCAI)*, New York, NY, 7/11/2016.

226. Dickerson, J., Kazachkov, A., Procaccia, A., and Sandholm T. 2016. Small Representations of Big Kidney Exchange Graphs. *EXPLORE-2016: The 3rd Workshop on Exploring Beyond the Worst Case in Computational Social Choice*, Singapore, 5/10/2016.

227. Brown, N. and Sandholm, T. 2016. Simultaneous Abstraction and Equilibrium Finding in Games. AAAI Workshop on Computer Poker and Imperfect Information Games, Phoenix, AZ, 2/13/2016.

228. Brown, N. and Sandholm, T. 2015. Regret-Based Pruning in Extensive-Form Games. *Neural Information Processing Systems (NIPS)*, Montreal, Canada. (Acceptance rate 22%.)

229. Kroer, C., Waugh, K., Kilinç-Karzan, F., and Sandholm, T. 2015. Faster First-Order Methods for Extensive-Form Game Solving. *ACM Conference on Economics and Computation (EC)*, Portland, OR. (Acceptance rate 33%.)

230. Blum, A., Dickerson, J., Haghtalab, N., Procaccia, A., and Sandholm, T. 2015. Ignorance is Almost Bliss: Near-Optimal Stochastic Matching With Few Queries. *ACM Conference on Economics and Computation (EC)*, Portland, OR. (Acceptance rate 33%.)

231. Brown, N. and Sandholm, T. 2015. Simultaneous Abstraction and Equilibrium Finding in Games. *International Joint Conference on Artificial Intelligence (IJCAI)*, Buenos Aires, Argentina. (Overall acceptance rate 29%; our paper was further selected for a long talk. Also presented as a poster.)

232. Kroer, C. and Sandholm, T. 2015. Limited Lookahead in Incomplete-Information Games. *International Joint Conference on Artificial Intelligence (IJCAI)*, Buenos Aires, Argentina. (Acceptance rate 29%. Talk and poster.).

233. Brown, N., Ganzfried, S., and Sandholm, T. 2015. Hierarchical Abstraction, Distributed Equilibrium Computation, and Post-Processing, with Application to a Champion No-Limit Texas Hold'em Agent. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Istanbul, Turkey. (Full paper and oral presentation, acceptance rate 25%.)

234. Ganzfried, S. and Sandholm, T. 2015. Endgame Solving in Large Imperfect-Information Games. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Istanbul, Turkey. (Full paper and oral presentation, acceptance rate 25%.)

235. Kroer, C. and Sandholm, T. 2015. Discretization of Continuous Action Spaces in Extensive-Form Games. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Istanbul, Turkey. (Full paper and oral presentation, acceptance rate 25%. Also presented as a poster.)

236. Kroer, C. and Sandholm, T. 2015. Computational Bundling for Auctions. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Istanbul, Turkey. (Full paper and oral presentation, acceptance rate 25%.)

237. Dickerson, J. and Sandholm, T. 2015. FutureMatch: Combining Human Value Judgments and Machine Learning to Match in Dynamic Environments. *AAAI Conference on Artificial Intelligence (AAAI)*, Austin, TX. (Oral track, acceptance rate 12%.)

238. Hajaj, C., Dickerson, J., Hassidim, A., Sandholm, T., and Sarne, D. 2015. Strategy-Proof and Efficient Kidney Exchange Using a Credit Mechanism. *AAAI Conference on Artificial Intelligence (AAAI)*, Austin, TX. (Oral track, acceptance rate 12%. Also selected to the Easily Accessible session.)

239. Hajaj, C., Dickerson, J., Hassidim, A., Sandholm, T., and Sarne, D. 2015. Strategy-Proof and Efficient Kidney Exchange Using a Credit Mechanism. *13th Bar-Ilan Symposium on the Foundations of Artificial Intelligence (BISFAI)*, Bar-Ilan University, Ramat Gan, Israel.

240. Sandholm, T. 2015. Steering Evolution Strategically: Computational Game Theory and Opponent Exploitation for Treatment Planning, Drug Design, and Synthetic Biology. *AAAI Conference on Artificial Intelligence (AAAI)*, Austin, TX. Senior Member Track, Blue Sky category.

241. Sandholm, T. 2015. Abstraction for Solving Large Incomplete-Information Games. *AAAI Conference on Artificial Intelligence (AAAI)*, Austin, TX. Senior Member Track, summary paper category.

242. Das, S., Dickerson, J., Li, Z., and Sandholm, T. 2015. Competing Dynamic Matching Markets. *Conference on Auctions, Market Mechanisms and Their Applications (AMMA)*, Chicago, IL.

243. Dickerson, J. and Sandholm, T. 2015. Uncertainty in Dynamic Matching with Application to Organ Exchange. *NIPS workshop on Machine Learning for Healthcare*, Montreal, Canada. (Only 6.7% of the accepted papers were selected for oral presentation.)

244. Brown, N., Ganzfried, S., and Sandholm, T. 2015. Hierarchical Abstraction, Distributed Equilibrium Computation, and Post-Processing, with Application to a Champion No-Limit Texas Hold'em Agent. *Computer Poker and Imperfect Information Workshop at the AAAI Conference on Artificial Intelligence (AAAI)*, Austin, TX. (Also presented as poster.)

245. Ganzfried, S. and Sandholm, T. 2015. Endgame Solving in Large Imperfect-Information Games. *Computer Poker and Imperfect Information Workshop at the AAAI Conference on Artificial Intelligence (AAAI)*, Austin, TX. (Also presented as poster.)

246. Leishman, R., Stewart, D., Kucheryavaya, A., Callahan, L., Sandholm, T., Aeder, M. 2015. Reasons for Match Offer Refusals and Efforts to Reduce them in the OPTN/UNOS Kidney Paired Donation Pilot Program (KPDPP). *American Transplant Congress (ATC)*, Philadelphia, PA. (Further selected for oral presentation.)

247. Aeder, M., Stewart, D., Leishman, R., Callahan, L., Kucheryavaya, A., Sandholm, T., Formica, R. 2015. Impact of Cold Ischemic Time (CIT) and Distance Traveled on Shipped Kidneys in the OPTN/UNOS Kidney Paired Donation (KPD) Pilot Program (PP). *American Transplant Congress (ATC)*, Philadelphia, PA. (Further selected for oral presentation.)

248. Kroer, C. and Sandholm, T. 2015. Imperfect-Recall Abstractions with Bounds. *IJCAI workshop on Algorithmic Game Theory*, Buenos Aires, Argentina.

249. Jiang, A., Marcolino, L., Procaccia, A., Sandholm, T., Shah, N., and Tambe, M. 2014. Diverse Randomized Agents Vote to Win. *Neural Information Processing Systems (NIPS)*, Montreal, Canada. (Acceptance rate 25%.)

250. Kroer, C. and Sandholm, T. 2014. Extensive-Form Game Abstraction With Bounds. *ACM Conference on Economics and Computation (EC)*, Palo Alto, CA. (Acceptance rate 28%.)

251. Nguyen, T. and Sandholm, T. 2014. Optimizing Prices in Descending Clock Auctions. *ACM Conference on Economics and Computation (EC)*, Palo Alto, CA. (Acceptance rate 28%.) Also submitted into the Federal Communications Commission (FCC) Docket No. 12-268, that is, the incentive auction design docket.

252. Brown, N. and Sandholm, T. 2014. Regret Transfer and Parameter Optimization. *AAAI Conference on Artificial Intelligence (AAAI)*, Quebec City, Canada. (Both oral and poster presentation; acceptance rate significantly less than 28%.)

253. Dickerson, J. and Sandholm, T. 2014. Multi-Organ Exchange: The Whole is Greater than the Sum of its Parts. *AAAI Conference on Artificial Intelligence (AAAI)*, Quebec City, Canada. (Both oral and poster presentation; acceptance rate significantly less than 28%.)

254. Dickerson, J., Goldman, J., Karp, J., Procaccia, A., and Sandholm, T. 2014. The Computational Rise and Fall of Fairness. *AAAI Conference on Artificial Intelligence (AAAI)*, Quebec City, Canada. (Both oral and poster presentation; acceptance rate significantly less than 28%.)

255. Ganzfried, S. and Sandholm, T. 2014. Potential-Aware Imperfect-Recall Abstraction with Earth Mover's Distance in Imperfect-Information Games. *AAAI Conference on Artificial Intelligence (AAAI)*, Quebec City, Canada. (Acceptance rate 28%.)

256. Dickerson, J., Procaccia, A., and Sandholm, T. 2014. Price of Fairness in Kidney Exchange. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Paris, France. (Acceptance rate 24%.)

257. Gatti, N. and Sandholm, T. 2014. Finding the Pareto Curve in Bimatrix Games is Easy. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Paris, France. (Acceptance rate 24%.)

258. Debruhl, B., Kroer, C., Datta, A., Sandholm, T., and Tague, P. 2014. Power Napping with Loud Neighbors: Optimal Energy-Constrained Jamming and Anti-Jamming. ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec).

259. Dickerson, J. and Sandholm, T. 2014. Balancing Efficiency and Fairness in Dynamic Kidney Exchange. AAAI Workshop on Modern Artificial Intelligence for Health Analytics (MAIHA).

260. Leishman, R., Stewart, D., Monstello, C., Cherikh, W., Sandholm, T., Formica, R., Aeder, M. 2014. The OPTN Kidney Paired Donation Pilot Program (KPDPP): Reaching the Tipping Point in 2013. *World Transplant Congress (WTC)*, San Francisco, CA. (Full oral presentation.)

261. Aeder, M., Stewart, D., Leishman, R., Sandholm, T., Formica, R. 2014. Early Outcomes of Transplant Recipients in the OPTN Kidney Paired Donation Pilot Program. *World Transplant Congress (WTC)*, San Francisco, CA. (Full oral presentation.)

262. Stewart, D., Leishman, R., Kucheryavaya, A., Formica, R., Aeder, M., Bingaman, A., Gentry, S., Sandholm, T., and Ashlagi, I. 2014. Exploring the Candidate/Donor Compatibility Matrix to Identify Opportunities to Improve the OPTN KPD Pilot Program's Priority Point Schedule. *World Transplant Congress (WTC)*, San Francisco, CA. (Poster presentation.)

263. Dickerson, J. and Sandholm, T. 2014. Toward Multi-Organ Exchange. *World Transplant Congress (WTC)*, San Francisco, CA. (Poster presentation.)

264. Dickerson, J., Procaccia, A., and Sandholm, T. 2014. Price of Fairness in Kidney Exchange. *World Transplant Congress (WTC)*, San Francisco, CA. (Poster presentation.)

265. Dickerson, J. and Sandholm, T. 2014. FutureMatch: Learning to Match in Dynamic Environments. Late-breaking abstract, *World Transplant Congress (WTC)*, San Francisco, CA.

266. Dickerson, J., Procaccia, A., and Sandholm, T. 2014. Empirical Price of Fairness in Failure-Aware Kidney Exchange. *Towards Better and More Affordable Healthcare: Incentives, Game Theory, and Artificial Intelligence* workshop at the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Paris, France.

267. Dickerson, J., Goldman, J., Karp, J., Procaccia, A., and Sandholm, T. 2014. The Computational Rise and Fall of Fairness. *Workshop on Exploring Beyond the Worst Case in Computational Social Choice (Explore 2014)* at the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Paris, France.

268. Ganzfried, S. and Sandholm, T. 2014. Potential-Aware Imperfect-Recall Abstraction with Earth Movers Distance in Imperfect-Information Games. *AAAI Workshop on Computer Poker and Imperfect Information.* (In addition, a lightly-reviewed poster was presented at the workshop's poster session.)

269. Kroer, C. and Sandholm, T. 2014. Extensive-Form Game Abstraction With Bounds. *AAAI Workshop on Computer Poker and Imperfect Information.*

270. Brown, N. and Sandholm, T. 2014. Regret Transfer and Parameter Optimization. *AAAI Workshop on Computer Poker and Imperfect Information.* (In addition, a lightly-reviewed poster was presented at the workshop's poster session.)

271. Dickerson, J., Procaccia, A., and Sandholm, T. 2013. Failure-Aware Kidney Exchange. *ACM Conference on Electronic Commerce (EC)*, Philadelphia, PA. (Acceptance rate 32%.)

272. Kroer, C. and Sandholm, T. 2013. Computational Bundling for Auctions. Poster at the *ACM Conference on Electronic Commerce (EC)*, Philadelphia, PA.

273. Ganzfried, S. and Sandholm, T. 2013. Action Translation in Extensive-Form Games with Large Action Spaces: Axioms, Paradoxes, and the Pseudo-Harmonic Mapping. *International Joint Conference on Artificial Intelligence (IJCAI)*, Beijing, China. (Acceptance rate 28%.)

274. Sui, X., Boutilier, C., and Sandholm, T. 2013. Analysis and Optimization of Multi-dimensional Percentile Mechanisms. *International Joint Conference on Artificial Intelligence (IJCAI)*, Beijing, China. (Acceptance rate 28%.)

275. Gatti, N., Rocco, M., and Sandholm, T. 2013. Algorithms for strong Nash equilibrium with more than two agents. *AAAI Conference on Artificial Intelligence (AAAI)*, Bellevue, WA. (Acceptance rate 29%.)

276. Dickerson, J. and Sandholm, T. 2013. Throwing darts: Random sampling helps tree search when the number of short certificates is moderate. *AAAI Conference on Artificial Intelligence (AAAI)*, late-breaking paper track, Bellevue, WA. (Acceptance rate 46%.)

277. Gatti, N., Rocco, M., and Sandholm, T. 2013. Strong Nash equilibrium is in smoothed P. *AAAI Conference on Artificial Intelligence (AAAI)*, late-breaking paper track, Bellevue, WA. (Acceptance rate 46%.)

278. Sandholm, T. 2013. Modern Dynamic Organ Exchanges: Algorithms and Market Design *AAAI Conference on Artificial Intelligence (AAAI)*, Bellevue, WA. Senior Member Track reviewed presentation.

279. Gatti, N., Rocco, M., and Sandholm, T. 2013. On the verification and computation of strong Nash equilibrium. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Saint Paul, MN. (Acceptance rate 23%.)

280. Leishman, R., Formica, R., Andreoni, K., Friedewald, J., Sleeman, E., Monstello, C., Stewart, D., and Sandholm, T. 2013. The Organ Procurement and Transplantation Network (OPTN) Kidney Paired Donation Pilot Program (KPDPP): Review of Current Results. *American Transplant Congress (ATC)*, Seattle, WA. Abstract of talk. Abstract published in *American Journal of Transplantation*, p. 135, 2013.

281. Leishman, R., Formica, R., Andreoni, K., Friedewald, J., Sleeman, E., Monstello, C., Stewart, D., and Sandholm, T. 2013. An Early Look at Transplant Outcomes from the OPTN KPD Pilot Program: Comparing Cold Times and DGF Rates with Other Living and Deceased Donor Transplants. *American Transplant Congress (ATC)*, Seattle, WA. Abstract of talk. Abstract published in *American Journal of Transplantation*, p. 135, 2013.

282. Stewart, D., Leishman, R., Sleeman, E., Monstello, C., Lunsford, G., Maghirang, J., Sandholm, T., Gentry, S., Formica, R., Friedewald, J., and Andreoni, K. 2013. Tuning the OPTN's KPD Optimization Algorithm to Incentivize Centers to Enter Their "Easy-to-Match" Pairs. *American Transplant Congress (ATC)*, Seattle, WA. Abstract of talk. Abstract published in *American Journal of Transplantation*, p. 179, 2013.

283. Dickerson, J. and Sandholm, T. 2013. Liver and Multi-Organ Exchange. *American Transplant Congress (ATC)*, Seattle, WA. Abstract of poster.

284. Dickerson, J., Procaccia, A., and Sandholm, T. 2013. Optimizing Kidney Exchange with Transplant Chains: Theory and Reality. *American Transplant Congress (ATC)*, Seattle, WA. Abstract of poster. Abstract published in *American Journal of Transplantation*, p. 268, 2013.

285. Dickerson, J., Procaccia, A., and Sandholm, T. 2013. Results about, and Algorithms For, Robust Probabilistic Kidney Exchange Matching. *American Transplant Congress (ATC)*, Seattle, WA. Abstract of poster. Abstract published in *American Journal of Transplantation*, p. 269, 2013.

286. Ganzfried, S. and Sandholm, T. 2013. Improving Performance in Imperfect-Information Games with Large State and Action Spaces by Solving Endgames. *IJCAI Workshop on Computer Games.*

287. Dickerson, J. and Sandholm, T. 2013. Liver and Multi-Organ Exchange. *IJCAI Workshop on Constraint Reasoning, Planning and Scheduling Problems for a Sustainable Future (GREEN-COPLAS).*

288. Dickerson, J. and Sandholm, T. 2013. Throwing darts: Random sampling helps tree search when the number of short certificates is moderate. *Symposium on Combinatorial Search (SoCS)*, Leavenworth, WA. (Acceptance rate 48%.)

289. Ganzfried, S. and Sandholm, T. 2013. Improving Performance in Imperfect-Information Games with Large State and Action Spaces by Solving Endgames. AAAI Workshop on Computer Poker and Incomplete Information, oral and poster presentation.

290. Ganzfried, S. and Sandholm, T. 2013. Action Translation in Extensive-Form Games with Large Action Spaces: Axioms, Paradoxes, and the Pseudo-Harmonic Mapping. AAAI Workshop on Computer Poker and Incomplete Information, poster presentation.

291. Ganzfried, S. and Sandholm, T. 2012. Safe Opponent Exploitation. *ACM Conference on Electronic Commerce (EC)*, Valencia, Spain. (Acceptance rate 33%; 11% for plenary track.) Talk in the plenary (non-parallel) track. Also presented in the poster session.

292. Sandholm, T. and Singh, S. 2012. Lossy Stochastic Game Abstraction with Bounds. *ACM Conference on Electronic Commerce (EC)*, Valencia, Spain. (Acceptance rate 33%.) (Full oral presentation; also presented in the poster session.)

293. Othman, A. and Sandholm, T. 2012. Profit-Charging Market Makers with Bounded Loss, Vanishing Bid/Ask Spreads, and Unlimited Market Depth. *ACM Conference on Electronic Commerce (EC)*, Valencia, Spain. (Acceptance rate 33%.) (Full oral presentation; also presented in the poster session.)

294. Dickerson, J., Procaccia, A., and Sandholm, T. 2012. Dynamic Matching via Weighted Myopia with Application to Kidney Exchange. *AAAI Conference on Artificial Intelligence (AAAI)*, Toronto, Canada. (Acceptance rate 26%.)

295. Tang, P. and Sandholm, T. 2012. Optimal Auctions for Spiteful Bidders. *AAAI Conference on Artificial Intelligence (AAAI)*, Toronto, Canada. (Acceptance rate 26%.)

296. Dickerson, J., Procaccia, A., and Sandholm, T. 2012. Optimizing Kidney Exchange with Transplant Chains: Theory and Reality. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Valencia, Spain. (Full paper, acceptance rate 20%.)

297. Ganzfried, S., Sandholm, T., and Waugh, K. 2012. Strategy Purification and Thresholding: Effective Non-Equilibrium Approaches for Playing Large Games. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Valencia, Spain. (Full paper, acceptance rate 20%.)

298. Othman, A. and Sandholm, T. 2012. Rational Market Making with Probabilistic Knowledge. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Valencia, Spain. (Full paper, acceptance rate 20%.)

299. Tang, P. and Sandholm, T. 2012. Mixed-Bundling Auctions with Reserve Prices. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Valencia, Spain. (Full paper, acceptance rate 20%.)

300. Gatti, N., Patrini, G., Rocco, M., and Sandholm, T. 2012. Combining Local Search Techniques and Path Following for Bimatrix Games. *Conference on Uncertainty in Artificial Intelligence (UAI)*, Catalina Island, CA, 8/15–17. (Acceptance rate 31%.)

301. Jiang, A., Yin, Z., Johnson, M., Tambe, M., Kiekintveld, C., Leyton-Brown, K., and Sandholm, T. 2012 TRUSTS: Scheduling Randomized Patrols for Fare Inspection in Transit Systems. *Innovative Applications of Artificial Intelligence (IAAI) Conference*, Toronto, Canada.

302. Jiang, A., Yin, Z., Johnson, M., Tambe, M., Kiekintveld, C., Leyton-Brown, K., and Sandholm, T. 2012. Towards Optimal Patrol Strategies for Fare Inspection in Transit Systems. *AAAI Spring Symposium on Game Theory for Security, Sustainability and Health*, Stanford University, CA.

303. Sui, X., Boutilier, C., and Sandholm, T. 2012. Analysis and Optimization of Multidimensional Percentile Mechanisms. *International Workshop on Computational Social Choice (COMSOC)*, Krakow, Poland.

304. Ganzfried, S. and Sandholm, T. 2012. Tartanian5: A Heads-Up No-Limit Texas Hold'em Poker-Playing Program. Oral presentation paper at the *Computer Poker Symposium* at the AAAI Conference on Artificial Intelligence (AAAI), July 23, Toronto, CA. Also accepted for poster presentation at the symposium and at a poster session at the main AAAI conference.

305. Ganzfried, S. and Sandholm, T. 2012. Safe Opponent Exploitation. *Adaptive and Learning Agents (ALA)* workshop at the International Conference on Autonomous and Multi-Agent Systems (AAMAS), Valencia, Spain. (Long presentation track).

306. Othman, A. and Sandholm, T. 2012. Inventory-Based versus Prior-Based Options Trading Agents. *Workshop on Risk Aversion in Algorithmic Game Theory and Mechanism Design* at the ACM Conference on Electronic Commerce (EC), Valencia, Spain, June 7.

307. Sandholm, T. and Singh, S. 2012. Lossy Stochastic Game Abstraction with Bounds. *Optimization in Multi-Agent Systems (OptMAS)* workshop at the International Conference on Autonomous and Multi-Agent Systems (AAMAS), Valencia, Spain.

308. Tang, P. and Sandholm, T. 2012. Coalitional Structure of the Muller-Satterthwaite Theorem. *Workshop on Cooperative Games in Multiagent Systems (CoopMAS) at the International Conference on Autonomous Agents and Multiagent Systems (AAMAS).*

309. Tang, P. and Sandholm, T. 2011. Approximating optimal combinatorial auctions for complements using restricted welfare maximization. In Proceedings of the *International Joint Conference on Artificial Intelligence (IJCAI)*, Barcelona, Spain. (Full paper, oral and poster track, acceptance rate 17%.)

310. Ganzfried, S. and Sandholm, T. 2011. Game Theory-Based Opponent Modeling in Large Imperfect-Information Games. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Taipei, Taiwan. (Full paper, acceptance rate 22%.)

311. Ganzfried, S., Sandholm, T., and Waugh, K. 2011. Strategy Purification. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Taipei, Taiwan. (Extended abstract, acceptance rate 45%.)

312. Benisch, M. and Sandholm, T. 2011. A Framework for Automated Bundling and Pricing Using Purchase Data. *Conference on Auctions, Market Mechanisms and Their Applications (AMMA)*, New York, NY. (Archival track.)

313. Othman, A. and Sandholm, T. 2011. Automated Market Makers That Enable New Settings: Extending Constant-Utility Cost Functions. *Conference on Auctions, Market Mechanisms and Their Applications (AMMA)*, New York, NY. (Archival track.)

314. Othman, A. and Sandholm, T. 2011. Liquidity-Sensitive Automated Market Makers via Homogeneous Risk Measures. *Workshop on Internet and Network Economics (WINE)*, Singapore. (Full paper, acceptance rate 30%.)

315. Tang, P. and Sandholm, T. 2011. Approximating optimal combinatorial auctions for complements using restricted welfare maximization. ACM Conference on Electronic Commerce (EC) *Workshop on Bayesian Mechanism Design*, San Jose, CA.

316. Ganzfried, S., Sandholm, T., and Waugh, K. 2011. Strategy Purification. *AAAI Conference on Artificial Intelligence (AAAI), Workshop on Applied Adversarial Reasoning and Risk Modeling*, San Francisco, CA.

317. Othman, A. and Sandholm, T. 2010. Automated Market-Making in the Large: The Gates Hillman Prediction Market. *ACM Conference on Electronic Commerce (EC)*, Cambridge, MA. (Acceptance rate 33%.)

318. Othman, A., Pennock, D., Reeves, D., and Sandholm, T. 2010. A Practical Liquidity-Sensitive Automated Market Maker. *ACM Conference on Electronic Commerce (EC)*, Cambridge, MA. (Acceptance rate 33%.)

319. Walsh, W., Boutilier, C., Sandholm, T., Shields, R., Nemhauser, G., and Parkes, D. 2010. Automated Channel Abstraction for Advertising Auctions. *AAAI Conference on Artificial Intelligence (AAAI)*, Atlanta. (Acceptance rate 26.9%.)

320. Othman, A. and Sandholm, T. 2010. Envy Quotes and the Iterated Core-Selecting Combinatorial Auction. *AAAI Conference on Artificial Intelligence (AAAI)*, Atlanta. (Acceptance rate 26.9%.)

321. Sharma, A. and Sandholm, T. 2010. Asymmetric spite in auctions. *AAAI Conference on Artificial Intelligence (AAAI)*, Atlanta. (Acceptance rate 26.9%.)

322. Othman, A. and Sandholm, T. 2010. Decision Rules and Decision Markets. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Toronto, Canada, May. (Full paper, acceptance rate 24%.)

323. Othman, A. and Sandholm, T. 2010. When Do Markets with Simple Agents Fail? *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Toronto, Canada, May. (Full paper, acceptance rate 24%.)

324. Othman, A., Sandholm, T., Budish, E. 2010. Finding Approximate Competitive Equilibria: Efficient and Fair Course Allocation. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Toronto, Canada, May. (Full paper, acceptance rate 24%.)

325. Ganzfried, S. and Sandholm, T. 2010. Computing Equilibria by Incorporating Qualitative Models. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Toronto, Canada, May. (Full paper, acceptance rate 24%.)

326. Krysta, P., Michalak, T., Sandholm, T., and Wooldridge, M. 2010. Combinatorial Auctions with Externalities (Extended Abstract). *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Toronto, Canada, May. (Short paper; acceptance rate for long and short papers in aggregate 44%.)

327. Gilpin, A. and Sandholm, T. 2010. Speeding Up Gradient-Based Algorithms for Sequential Games (Extended Abstract). *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Toronto, Canada, May. (Short paper; acceptance rate for long and short papers in aggregate 44%.)

328. Ganzfried, S. and Sandholm, T. 2010. Computing Equilibria by Incorporating Qualitative Models. *Second Brazilian Workshop of the Game Theory Society* in honor of John Nash, on the occasion of the 60th anniversary of Nash Equilibrium, Sao Paulo, 7/29–8/4, 2010.

329. Gilpin, A. and Sandholm, T. 2010. Speeding Up Modern Gradient-Based Algorithms for Large Sequential Games. *6th International Workshop on Parallel Matrix Algorithms and Applications (PMAA)*, 6/30–7/2, University of Basel, Switzerland.

330. Awasthi, P. and Sandholm, T. 2009. Online Stochastic Optimization in the Large: Application to Kidney Exchange. In Proceedings of the *International Joint Conference on Artificial Intelligence (IJCAI)*, Pasadena, CA. (Full oral paper, acceptance rate 25.7%.)

331. Benisch, M., Sadeh, N., and Sandholm, T. 2009. Methodology for Designing Reasonably Expressive Mechanisms with Application to Ad Auctions. In Proceedings of the *International Joint Conference on Artificial Intelligence (IJCAI)*, Pasadena, CA. (Full oral paper, acceptance rate 25.7%.)

332. Ganzfried, S. and Sandholm, T. 2009. Computing Equilibria in Multiplayer Stochastic Games of Imperfect Information. In Proceedings of the *International Joint Conference on Artificial Intelligence (IJCAI)*, Pasadena, CA. (Full oral paper, acceptance rate 25.7%.)

333. Othman, A. and Sandholm, T. 2009. How Pervasive is the Myerson-Satterthwaite Impossibility? In Proceedings of the *International Joint Conference on Artificial Intelligence (IJCAI)*, Pasadena, CA. (Full oral paper, acceptance rate 25.7%.)

334. Othman, A. and Sandholm, T. 2009. Better with Byzantine: Manipulation-Optimal Mechanisms. *Symposium on Algorithmic Game Theory (SAGT)*, Cyprus. (Acceptance rate 54%.)

335. Andreoni, K., Sleeman, E., Hanto, R., McBride, M., Cherikh, W., Samana, C., Segev, D., Gentry, S., Sandholm, T., and Cecka, J. 2009. Development of a National Kidney Paired Donation Pilot Program. *American Transplant Conference (ATC)*, May 30 – June 3, Boston, MA. (Poster presentation.) Abstract published in *American Journal of Transplantation (AJT)*, p. 435.

336. Rees, M., Kopke, J., Pelletier, R., Segev, D., Fabrega, A., Rogers, J., Pankewycz, O., Hiller, J., Roth, A., Sandholm, T., Ünver, U., Nibhanubpudy, R., Bowers, V., VanBuren, C., and Montgomery, R. 2009. Six Nonsimultaneous Extended Altruistic Donor (NEAD) Chains. *American Transplant Conference (ATC)*, May 30 – June

3, Boston, MA. (Poster presentation.) Early abstract with four chains published in *American Journal of Transplantation (AJT)*, p. 389.

337. Benisch, M., Kelley, P., Sadeh, N., Sandholm, T., Tsai, J., Cranor, L., Drielsma, P., and Drielsma, P. 2009. The Impact of Expressiveness on the Effectiveness of Privacy Mechanisms for Location Sharing. *Symposium on Usable Privacy and Security (SOUPS)*. (Poster.)

338. Walsh, W., Boutilier, C., Sandholm., T., Shields, R., Nemhauser, G., Parkes, D. 2009. Automated Channel Abstraction for Advertising Auctions. *Fifth Ad Auctions Workshop* at the *ACM Conference on Electronic Commerce (EC)*, Stanford, CA, July 6th.

339. Benisch, M., Sadeh, N., and Sandholm, T. 2008. A Theory of Expressiveness in Mechanisms. *AAAI Conference on Artificial Intelligence (AAAI)*, Vancouver. (Full paper, acceptance rate 24%.)

340. Boutilier, C., Parkes, D., Sandholm, T., and Walsh, W. 2008. Expressive Banner Ad Auctions and Model-Based Online Optimization for Clearing. *AAAI Conference on Artificial Intelligence (AAAI)*, Vancouver. (Full paper, acceptance rate 24%.)

341. Gilpin, A., Peña, J., and Sandholm, T. 2008. First-order Algorithm with $O(\ln(1/\epsilon))$ Convergence for ϵ-Equilibrium in Games. *AAAI Conference on Artificial Intelligence (AAAI)*, Vancouver. (Full paper, acceptance rate 24%.)

342. Gilpin, A. and Sandholm, T. 2008. Expectation-based versus potential-aware automated abstraction in games: An experimental comparison. *AAAI Conference on Artificial Intelligence (AAAI)*, Vancouver. (Short paper, acceptance rate 26% for full and short papers together.)

343. Walsh, W., Boutilier, C., Parkes, D., and Sandholm, T. 2008. Computing Reserve Prices and Identifying the Value Distribution in Real-world Auctions with Market Disruptions. *AAAI Conference on Artificial Intelligence (AAAI)*, Vancouver. (Short paper, acceptance rate 26% for full and short papers together.)

344. Ganzfried, S. and Sandholm, T. 2008. Computing an Approximate Jam/Fold Equilibrium for 3-Agent No-Limit Texas Hold'em Tournaments. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Estoril, Portugal, May. (Full paper, acceptance rate 22%.)

345. Gilpin, A. and Sandholm, T. 2008. A heads-up no-limit Texas Hold'em poker player: Discretized betting models and automatically generated equilibrium-finding programs. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Estoril, Portugal, May. (Full paper, acceptance rate 22%.)

346. Gilpin, A. and Sandholm, T. 2008. Solving two-person zero-sum repeated games of incomplete information. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Estoril, Portugal, May. (Full paper, acceptance rate 22%.)

347. Benisch, M., Sadeh, N., and Sandholm, T. 2008. A Theory of Expressiveness in Mechanisms. *International Congress of the Game Theory Society (GAMES)*, Evanston, IL, July 13–17. (Full-length presentation.)

348. Walsh, W., Boutilier, C., Parkes, D., and Sandholm, T. 2008. Computing Reserve Prices in Real-World English Auctions. *International Congress of the Game Theory Society (GAMES)*, Evanston, IL, July 13–17. (Full-length presentation.)

349. Sandholm, T., Gilpin, A., Sørensen, T., Peña, J., and Hoda, S. 2008. Game-theory-based approaches to full-scale Heads-Up Texas Hold'em poker: Automated abstraction and scalable equilibrium-finding algorithms. *International Congress of the Game Theory Society (GAMES)*, Evanston, IL, July 13–17. (Full-length presentation.)

350. Othman, A. and Sandholm, T. 2008. Beyond the Revelation Principle: Manipulation-Optimal Mechanisms. *International Congress of the Game Theory Society (GAMES)*, Evanston, IL, July 13–17. (Full-length presentation.)

351. Gilpin, A., Hoda, S., Peña, J., and Sandholm, T. 2008. Gradient-based algorithms for Nash equilibrium finding in huge sequential two-person zero-sum imperfect-information games. *International Congress of the Game Theory Society (GAMES)*, Evanston, IL, July 13–17. (Full-length presentation.)

352. Ganzfried, S. and Sandholm, T. 2008. Algorithms for Multiplayer Stochastic Games of Imperfect Information with Application to Three-Player No-Limit Texas Holdem Tournaments. *International Congress of the Game Theory Society (GAMES)*, Evanston, IL, July 13–17. (Poster presentation.)

353. Michael Rees, R. Pelletier, S. Mulgaonkar, D. Laskow, B. Nibhanupudy, Jonathan Kopke, Alvin Roth, Utku Ünver, Tuomas Sandholm, and Tayfun Sönmez. 2008. Report From A 60 Transplant Center Multiregional Kidney Paired Donation Program. Proceedings of the *International Congress of the Transplantation Society*, Sydney, Australia, August 10–14. (Oral presentation track.) Abstract published in *American Journal of Transplantation*, p. 605, 2008, and in *Transplantation* 86(2S), 2008.

354. Michael Rees, Jonathan Kopke, Garet Hil, William Reitsma, R. Pelletier, J. Rogers, Tuomas Sandholm, Alvin Roth, Utku Ünver, and R. Montgomery. 2008. The Never-Ending Altruistic Donor. Proceedings of the *International Congress of the Transplantation Society*, Sydney, Australia, August 10–14. (Oral presentation track.) Abstract published in *American Journal of Transplantation*, p. 288, 2008, and in *Transplantation* 86(2S), 2008.

355. Othman, A. and Sandholm, T. 2008. The Cost and Windfall of Manipulability. *Computational Social Choice Workshop (COMSOC)*, Liverpool, UK, September. (Acceptance rate 65%.)

356. Boutilier, C., Parkes, D., Sandholm, T., and Walsh, W. 2008. Expressive Banner Ad Auctions and Model-Based Online Optimization for Clearing. In Proceedings of the

Fourth Workshop on Ad Auctions, Chicago, July 8–9, 2008, in conjunction with the *ACM Conference on Electronic Commerce (EC)*.

357. Benisch, M., Sadeh, N., Sandholm, T. 2008. The Cost of Inexpressiveness in Advertisement Auctions. In Proceedings of the *Fourth Workshop on Ad Auctions*, Chicago, July 8–9, 2008, in conjunction with the *ACM Conference on Electronic Commerce (EC)*.

358. Gilpin, A., Sandholm, T., and Sørensen, T. 2007. Potential-Aware Automated Abstraction of Sequential Games, and Holistic Equilibrium Analysis of Texas Hold'em Poker. *AAAI Conference on Artificial Intelligence (AAAI)*, Vancouver. (Full paper, acceptance rate 27%.)

359. Kleinberg, R., Hajiaghayi, M., and Sandholm, T. 2007. Automated Online Mechanism Design and Prophet Inequalities. *AAAI Conference on Artificial Intelligence (AAAI)*, Vancouver. (Full paper, acceptance rate 27%.)

360. Sandholm, T., Conitzer, V., and Boutilier, C. 2007. Automated Design of Multistage Mechanisms. *International Joint Conference on Artificial Intelligence (IJCAI)*, Hyderabad, India. (Oral presentation track; acceptance rate 16%.)

361. Conitzer, V. and Sandholm, T. 2007. Incremental Mechanisms Design. *International Joint Conference on Artificial Intelligence (IJCAI)*, Hyderabad, India. (Acceptance rate 35%.)

362. Gilpin, A. and Sandholm, T. 2007. Information-theoretic approaches to branching in search. *International Joint Conference on Artificial Intelligence (IJCAI)*, Hyderabad, India. (Acceptance rate 35%.)

363. Brandt, F., Sandholm, T., and Shoham, Y. 2007. Spiteful Bidding in Sealed-Bid Auctions. *International Joint Conference on Artificial Intelligence (IJCAI)*, Hyderabad, India. (Acceptance rate 35%.)

364. Abraham, D., Blum, A., and Sandholm, T. 2007. Clearing Algorithms for Barter Exchange Markets: Enabling Nationwide Kidney Exchanges. *ACM Conference on Electronic Commerce (EC)*, San Diego. (Full paper, acceptance rate 27%.)

365. Gilpin, A. and Sandholm, T. 2007. Better automated abstraction techniques for imperfect information games, with application to Texas Hold'em poker. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Honolulu. (Full paper, acceptance rate 22%.)

366. Gilpin, A., Hoda, S., Peña, J., and Sandholm, T. 2007. Gradient-based algorithms for finding Nash equilibria in extensive form games. *International Conference on Game Theory*, July 9-13, Stony Brook University, NY. (Full oral presentation track.)

367. Gilpin, A., Hoda, S., Peña, J., and Sandholm, T. 2007. Computational Experience with a First-order Algorithm for Computing Nash Equilibria in Sequential Games. At the *Second International Conference on Continuous Optimization (ICCOPT)*, McMaster University, Hamilton, Ontario, Canada, August 13–16. Invited.

368. Gilpin, A., Hoda, S., Peña, J., and Sandholm, T. 2007. Gradient-based algorithms for finding Nash equilibria in extensive form games. *3rd International Workshop on Internet and Network Economics (WINE)*. (Long paper.) Springer LNCS 4858.

369. Gilpin, A. and Sandholm, T. 2006. A competitive Texas Hold'em Poker player via automated abstraction and real-time equilibrium computation. *National Conference on Artificial Intelligence (AAAI)*, Boston, MA. (Full-length paper; oral presentation track; acceptance rate 22%.)

370. Conitzer, V. and Sandholm, T. 2006. Nonexistence of Voting Rules That Are Usually Hard to Manipulate. *National Conference on Artificial Intelligence (AAAI)*, Boston, MA. (Full-length paper; oral presentation track; acceptance rate 22%.)

371. Benisch, M., Davis, G., and Sandholm, T. 2006. Algorithms for rationalizability and CURB sets. *National Conference on Artificial Intelligence (AAAI)*, Boston, MA. (Full-length paper; oral presentation track; acceptance rate 22%.)

372. Ohta, N., Iwasaki, A., Yokoo, M., Maruono, K., Conitzer, V., and Sandholm, T. 2006. A Compact Representation Scheme for Coalitional Games in Open Anonymous Environments. *National Conference on Artificial Intelligence (AAAI)*, Boston, MA. (Full-length paper; acceptance rate 30%.)

373. Conitzer, V. and Sandholm, T. 2006. Computing the Optimal Strategy to Commit to. *ACM Conference on Electronic Commerce (EC)*, Ann Arbor, MI, June 11–15. (Acceptance rate 29%.)

374. Gilpin, A. and Sandholm, T. 2006. Finding Equilibria in Large Sequential Games of Imperfect Information. *ACM Conference on Electronic Commerce (EC)*, Ann Arbor, MI, June 11–15. (Acceptance rate 29%.)

375. Conitzer, V. and Sandholm, T. 2006. A Technique for Reducing Normal Form Games for Computing a Nash Equilibrium. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Hakodate, Japan, May. (Long paper, oral presentation, acceptance rate 11%.) Earlier version:

376. Sandholm, T. and Gilpin, A. 2006. Sequences of Take-It-Or-Leave-It Offers: Near-Optimal Auctions Without Full Valuation Revelation. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Hakodate, Japan, May. (Long paper, oral presentation, acceptance rate 11%.)

377. Conitzer, V. and Sandholm, T. 2006. Failures of the VCG mechanism in combinatorial auctions and exchanges. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Hakodate, Japan, May. (Long paper, acceptance rate 23%.)

378. Gilpin, A. and Sandholm, T. 2006. Information-theoretic approaches to branching in search. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Hakodate, Japan, May. (Short paper, acceptance rate 48%.)

379. Sandholm, T. 2006. Expressive Commerce and Its Application to Sourcing. *Innovative Applications of Artificial Intelligence (IAAI)* conference, Boston, MA, June. (Deployed Application Track.)

380. Conitzer, V. and Sandholm, T. 2006. Nonexistence of Voting Rules That Are Usually Hard to Manipulate. *17th International Conference on Game Theory*, State University of New York, Stony Brook, July 10–14, 2006.

381. Gilpin, A. and Sandholm, T. 2006. A competitive Texas Hold'em Poker player via automated abstraction and real-time equilibrium computation. *17th International Conference on Game Theory*, State University of New York, Stony Brook, July 10–14, 2006.

382. Benisch, M., Davis, G., and Sandholm, T. 2006. Algorithms for rationalizability and CURB sets. *Alternative Solution Concepts workshop* at the ACM Conference on Electronic Commerce (EC), Ann Arbor, MI, June.

383. Conitzer, V. and Sandholm, T. 2006. A Generalized Strategy Eliminability Criterion and Computational Methods for Applying It. *Alternative Solution Concepts workshop* at the ACM Conference on Electronic Commerce (EC), Ann Arbor, MI, June.

384. Conitzer, V. and Sandholm, T. 2006. Incrementally Making Mechanisms More Strategy-Proof. *Multidisciplinary ECAI-06 workshop on Advances on Preference Handling.*, August 28–29, 2006, Riva del Garda, Italy.

385. Sandholm, T., Gilpin, A., and Conitzer, V. 2005. Mixed-Integer Programming Methods for Finding Nash Equilibria. *National Conference on Artificial Intelligence (AAAI)*, Pittsburgh, Pennsylvania. (Oral presentation, acceptance rate 18%.)

386. Conitzer, V., Sandholm, T., and Santi, P. 2005. Combinatorial Auctions with k-wise Dependent Valuations. *National Conference on Artificial Intelligence (AAAI)*, Pittsburgh, Pennsylvania. (Oral presentation, acceptance rate 18%.)

387. Likhodedov, A. and Sandholm, T. 2005. Approximating revenue-maximizing combinatorial auctions. *National Conference on Artificial Intelligence (AAAI)*, Pittsburgh, Pennsylvania. (Oral presentation, acceptance rate 18%.)

388. Yokoo, M., Conitzer, V., Sandholm, T., Ohta, N., and Iwasaki, A. 2005. Coalitional Games in Open Anonymous Environments. *National Conference on Artificial Intelligence (AAAI)*, Pittsburgh, Pennsylvania. (Oral presentation, acceptance rate 18%.)

389. Conitzer, V. and Sandholm, T. 2005. A Generalized Strategy Eliminability Criterion and Computational Methods for Applying It. *National Conference on Artificial Intelligence (AAAI)*, Pittsburgh, Pennsylvania. (Acceptance rate 28%.)

390. Conitzer, V. and Sandholm, T. 2005. Expressive Negotiation in Settings with Externalities. *National Conference on Artificial Intelligence (AAAI)*, Pittsburgh, Pennsylvania. (Acceptance rate 28%.)

391. Conitzer, V. and Sandholm, T. 2005. Communication Complexity of Common Voting Rules. *ACM Conference on Electronic Commerce (EC)*, Vancouver, Canada, June. (Acceptance rate 29%.)

392. Conitzer, V. and Sandholm, T. 2005. Complexity of (Iterated) Dominance. *ACM Conference on Electronic Commerce (EC)*, Vancouver, Canada, June. (Acceptance rate 29%.)

393. Brandt, F. and Sandholm, T. 2005. Decentralized Voting with Unconditional Privacy. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Utrecht, Netherlands, July. (Acceptance rate 24%.)

394. Larson, K. and Sandholm, T. 2005. Mechanism Design and Deliberative Agents. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Utrecht, Netherlands, July. (Acceptance rate 24%.)

395. Brandt, F. and Sandholm, T. 2005. Efficient Privacy-Preserving Protocols for Multi-Unit Auctions. In Proceedings of *Financial Cryptography and Data Security (FC)*. (Acceptance rate 24%.)

396. Conitzer, V. and Sandholm, T. 2005. Common Voting Protocols as Maximum Likelihood Estimators. *Conference on Uncertainty in Artificial Intelligence (UAI)*. Oral presentation track. (Acceptance rate 34% overall, less for the oral track.)

397. Brandt, F. and Sandholm, T. 2005. Unconditional Privacy in Social Choice. *Tenth Conference on Theoretical Aspects of Rationality and Knowledge (TARK)*, Singapore, June. (Acceptance rate 32%.)

398. Yokoo, M., Conitzer, V., Sandholm, T., Ohta, N., and Iwasaki, A. 2005. Coalitional Games in Open Anonymous Environments. *International Joint Conference on Artificial Intelligence (IJCAI)*, Edinburgh, UK. (Poster paper.)

399. Yokoo, M., Conitzer, V., Sandholm, T., Ohta, N., and Iwasaki, A. 2005. A New Solution Concept for Coalitional Games in Open Anonymous Environments. *Annual Conference of the Japan Society on Artificial Intelligence (JSAI)*.

400. Larson, K. and Sandholm, T. 2005. Mechanism Design and Deliberative Agents. *DIMACS workshop on Bounded Rationality*, Rutgers, NJ, 1/31-2/1.

401. Parkes, D. and Sandholm, T. 2005. Optimize-and-Dispatch Architecture for Expressive Ad Auctions. *First Workshop on Sponsored Search Auctions* at the ACM Conference on Electronic Commerce, Vancouver, BC, Canada, June 5.

402. Conitzer, V. and Sandholm, T. 2005. A Technique for Reducing Normal Form Games to Compute a Nash Equilibrium. *Workshop on Game Theoretic and Decision Theoretic Agents (GTDT)*, at the International Joint Conference on Artificial Intelligence (IJCAI), Edinburgh, UK.

403. Brandt, F., Sandholm, T., and Shoham, Y. 2005. Spiteful Bidding in Sealed-Bid Auctions. *Workshop on Game Theoretic and Decision Theoretic Agents (GTDT)*, at the International Joint Conference on Artificial Intelligence (IJCAI), Edinburgh, UK.

404. Sandholm, T., Conitzer, V., and Boutilier, C. 2005. Automated Design of Multistage Mechanisms. *First International Workshop on Incentive Based Computing*, at the *IEEE / WIC / ACM International Conference on Web Intelligence (WI)*, Compiegne, France, September 19.

405. Conitzer, V. and Sandholm, T. 2004. Self-interested Automated Mechanism Design and Implications for Optimal Combinatorial Auctions. *ACM Conference on Electronic Commerce (EC)*, pp. 132-141, New York, NY, May. (Long paper, acceptance rate 16%.)

406. Conitzer, V. and Sandholm, T. 2004. Expressive Negotiation over Donations to Charities. *ACM Conference on Electronic Commerce (EC)*, pp. 51-60, New York, NY, May. (Long paper, acceptance rate 16%.)

407. Conitzer, V. and Sandholm, T. 2004. Computational Criticisms of the Revelation Principle. *ACM Conference on Electronic Commerce (EC)*, New York, NY, May. (Short paper, acceptance rate 32%.)

408. Conitzer, V. and Sandholm, T. 2004. Revenue failures and collusion in combinatorial auctions and exchanges with VCG payments. *ACM Conference on Electronic Commerce (EC)*, New York, NY, May. (Short paper, acceptance rate 32%.)

409. Likhodedov, A. and Sandholm, T. 2004. Mechanism for Optimally Trading Off Revenue and Efficiency in Multi-Unit Auctions. *ACM Conference on Electronic Commerce (EC)*, New York, NY, May. (Short paper, acceptance rate 32%.)

410. Larson, K. and Sandholm, T. 2004. Strategic Deliberation and Truthful Revelation: An Impossibility Result. *ACM Conference on Electronic Commerce (EC)*, New York, NY, May. (Short paper, acceptance rate 32%.)

411. Larson, K., and Sandholm, T. 2004. Using Performance Profile Trees to Improve Deliberation Control. *National Conference on Artificial Intelligence (AAAI)*, pp. 73–79, San Jose, CA, July. (Acceptance rate 27%.)

412. Conitzer, V., Derryberry, J., and Sandholm, T. 2004. Combinatorial Auctions with Structured Item Graphs. *National Conference on Artificial Intelligence (AAAI)*, pp. 212–218, San Jose, CA, July. (Acceptance rate 27%.)

413. Boutilier, C., Sandholm, T., and Shields, R. 2004. Eliciting Bid Taker Non-Price Preferences in (Combinatorial) Auctions. *National Conference on Artificial Intelligence (AAAI)*, pp. 204–211, San Jose, CA, July. (Acceptance rate 27%.)

414. Conitzer, V. and Sandholm, T. 2004. Computing Shapley Values, Manipulating Value Division Schemes, and Checking Core Membership in Multi-Issue Domains. *National*

Conference on Artificial Intelligence (AAAI), pp. 219–225, San Jose, CA, July. (Acceptance rate 27%.)

415. Likhodedov, A. and Sandholm, T. 2004. Methods for Boosting Revenue in Combinatorial Auctions. *National Conference on Artificial Intelligence (AAAI)*, pp. 232–237, San Jose, CA, July. (Acceptance rate 27%.)

416. Conitzer, V. and Sandholm, T. 2004. Communication Complexity as a Lower Bound for Learning in Games. *International Conference on Machine Learning (ICML)*, pp. 185–192, Banff, Canada, July. (Acceptance rate 32%.)

417. Hudson, B. and Sandholm, T. 2004. Effectiveness of Query Types and Policies for Preference Elicitation in Combinatorial Auctions. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, pp. 386–393, Columbia University, New York, July. (Acceptance rate 24%.)

418. Conen, W. and Sandholm, T. 2004. Coherent Pricing of Efficient Allocations in Combinatorial Economies. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Columbia University, New York, July. (Acceptance rate 24%.)

419. Larson, K. and Sandholm, T. 2004. Experiments on Deliberation Equilibria in Auctions. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Columbia University, New York, July. (Acceptance rate 24%.)

420. Brandt, F. and Sandholm, T. 2004. (Im)possibility of Unconditionally Privacy-Preserving Auctions. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Columbia University, New York, July. (Acceptance rate 24%.)

421. Conitzer, V. and Sandholm, T. 2004. An Algorithm for Automatically Designing Deterministic Mechanisms without Payments. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, pp. 128–135, Columbia University, New York, July. (Acceptance rate 24%.)

422. Kothari, A., Sandholm, T., and Suri, S. 2004. Solving Combinatorial Exchanges: Optimality via Few Partial Bids. *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Columbia University, New York, July. (Poster paper, acceptance rate 50%.)

423. Santi, P, Conitzer, V., and Sandholm, T. 2004. Towards a Characterization of Polynomial Preference Elicitation with Value Queries in Combinatorial Auctions. *Annual Conference on Learning Theory (COLT)*, pp. 1–16, Banff, Alberta, Canada. Springer LNCS 3120.

424. Likhodedov, A. and Sandholm, T. 2004. Mechanism for Optimally Trading Off Revenue and Efficiency in Multi-unit Auctions. *Sixth Conference on Logic and the Foundations of Game and Decision Theory (LOFT)*, Leipzig, Germany, July 16–18. (Long presentation track.)

425. Conitzer, V. and Sandholm, T. 2004. Computational Criticisms of the Revelation Principle. *Sixth Conference on Logic and the Foundations of Game and Decision Theory (LOFT)*, Leipzig, Germany, July 16–18. (Oral presentation, reviewed.)

426. Gilpin, A., and Sandholm, T. Arbitrage in Combinatorial Exchanges. *Second World Congress of the Game Theory Society*, Marseilles, France, July, 2004. Full oral presentation.

427. Sandholm, T. and Gilpin, A. 2004. Sequences of Take-It-Or-Leave-It Offers: Near-Optimal Auctions Without Full Valuation Revelation. *Second World Congress of the Game Theory Society*, Marseilles, France, July. Full oral presentation.

428. Likhodedov, A. and Sandholm, T. 2004. Mechanism for Optimally Trading Off Revenue and Efficiency in Multi-Unit Auctions. *Second World Congress of the Game Theory Society*, Marseilles, France, July. Full oral presentation. Significantly extended version that combines the results from our EC-03 poster paper and our EC-04 short paper.

429. Conitzer, V., Sandholm, T., and Lang, J. 2004. Voting Protocols that are Hard to Manipulate. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Full oral presentation.

430. Conitzer, V. and Sandholm, T. 2004. Complexity Results about Nash Equilibria. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Full oral presentation.

431. Likhodedov, A. and Sandholm, T. 2004. Methods for Boosting Revenue in Combinatorial Auctions. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Full oral presentation.

432. Larson, K. and Sandholm, T. 2004. Strategic Deliberation and Truthful Revelation: An Impossibility Result. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Full oral presentation.

433. Conitzer, V. and Sandholm, T. 2004. Complexity of (Iterated) Dominance and a New Definition of Eliminability. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Poster presentation.

434. Conitzer, V. and Sandholm, T. 2004. Expressive Negotiation over Donations to Charities. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Poster presentation.

435. Conitzer, V. and Sandholm, T. 2004. Communication Complexity as a Lower Bound for Learning in Games. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Poster presentation.

436. Conitzer, V. and Sandholm, T. 2004. AWESOME: A General Multiagent Learning Algorithm that Converges in Self-Play and Learns a Best Response Against Stationary

Opponents. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Poster presentation.

437. Conitzer, V. and Sandholm, T. 2004. Complexity of Constructing Solutions in the Core. *Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July. Poster presentation.

438. Conitzer, V. and Sandholm, T. 2004. Revenue failures and collusion in combinatorial auctions and exchanges with VCG payments. In proceedings of the *AAMAS-04 Workshop on Agent Mediated Electronic Commerce (AMEC-04)*, New York, NY, USA, 2004. (Acceptance rate: 37%.)

439. Larson, K. and Sandholm, T. 2004. Designing Auctions for Deliberative Agents. In proceedings of the *workshop on Agent Mediated Electronic Commerce (AMEC-04)*, pp. 225–238, New York, NY. (Poster paper, acceptance rate: 63%.)

440. Brandt, F. and Sandholm, T. 2004. On Correctness and Privacy in Distributed Mechanisms. In proceedings of the *AAMAS-04 Workshop on Agent Mediated Electronic Commerce (AMEC-04)*, pp. 1–14, New York, NY, USA, 2004. (Acceptance rate: 37%.)

441. Gilpin, A. and Sandholm, T. 2004. Arbitrage in Combinatorial Exchanges. In proceedings of the *AAMAS-04 Workshop on Agent Mediated Electronic Commerce (AMEC-04)*, pp. 43–56, New York, NY, USA, 2004. (Acceptance rate: 37%.)

442. Conitzer, V., Sandholm, T., and Santi, P. 2004. Elicitation in Combinatorial Auctions with Restricted Preferences and Bounded Interdependency Between Items. DIMACS Workshop on Computational Issues in Auction Design, Rutgers University, NJ, October 7–8. Oral presentation.

443. Boutilier, C., Sandholm, T., and Shields, R. 2004. Eliciting Bid Taker Non-Price Preferences in (Combinatorial) Auctions. *DIMACS Workshop on Computational Issues in Auction Design*, Rutgers, October 7–8. Oral presentation.

444. Gilpin, A., and Sandholm, T. 2004. Arbitrage in Combinatorial Exchanges. Poster at the *DIMACS Workshop on Computational Issues in Auction Design*, Rutgers, October 7–8.

445. Likhodedov, A. and Sandholm, T. 2004. Methods for Boosting Revenue in Combinatorial Auctions. Poster at the *DIMACS Workshop on Computational Issues in Auction Design*, Rutgers, October 7–8.

446. Conitzer, V. and Sandholm, T. 2003. Universal Voting Protocol Tweaks to Make Manipulation Hard. *International Joint Conference on Artificial Intelligence (IJCAI)*, Acapulco, Mexico, August. (Acceptance rate 21%.)

447. Conitzer, V. and Sandholm, T. 2003. Definition and Complexity of Some Basic Metareasoning Problems. *International Joint Conference on Artificial Intelligence (IJCAI)*, Acapulco, Mexico, August. (Acceptance rate 21%.)

448. Conitzer, V. and Sandholm, T. 2003. Complexity Results about Nash Equilibria. *International Joint Conference on Artificial Intelligence (IJCAI)*, Acapulco, Mexico, August. (Acceptance rate 21%.)

449. Conitzer, V. and Sandholm, T. 2003. Complexity of Determining Nonemptiness of the Core. *International Joint Conference on Artificial Intelligence (IJCAI)*, Acapulco, Mexico, August. (Acceptance rate 21%.)

450. Zinkevich, M, Blum, A. and Sandholm, T. 2003. On Polynomial-Time Preference Elicitation with Value Queries. *ACM Conference on Electronic Commerce (EC)*, pp. 176–185, San Diego, CA, June. (Acceptance rate 19%.)

451. Conitzer, V. and Sandholm, T. 2003. Automated Mechanism Design for a Self-Interested Designer. *ACM Conference on Electronic Commerce (EC)*, San Diego, CA, June. (Short paper, acceptance rate 58%.)

452. Conitzer, V. and Sandholm, T. 2003. Complexity of Determining Nonemptiness of the Core. *ACM Conference on Electronic Commerce (EC)*, San Diego, CA, June. (Short paper, acceptance rate 58%.)

453. Kothari, A., Sandholm, T., and Suri, S. 2003. Solving Combinatorial Exchanges: Optimality via Few Partial Bids. *ACM Conference on Electronic Commerce (EC)*, San Diego, CA, June. (Short paper, acceptance rate 58%.)

454. Hudson, B. and Sandholm, T. 2003. Using Value Queries in Combinatorial Auctions. *ACM Conference on Electronic Commerce (EC)*, San Diego, CA, June. (Short paper, acceptance rate 58%.)

455. Likhodedov, A. and Sandholm, T. 2003. Auction Mechanism for Optimally Trading Off Revenue and Efficiency. *ACM Conference on Electronic Commerce (EC)*, San Diego, CA, June. (Short paper, acceptance rate 58%.)

456. Conen, W. and Sandholm, T. 2003. *Differential*-revelation VCG mechanisms for combinatorial auctions. *ACM Conference on Electronic Commerce (EC)*, San Diego, CA, June. (Short paper, acceptance rate 58%.)

457. Conitzer, V. and Sandholm, T. 2003. BL-WoLF: A Framework For Loss-Bounded Learnability In Zero-Sum Games. *International Conference on Machine Learning (ICML)*, pp. 91–98, Washington, DC. (Acceptance rate 32%.)

458. Wang, X. and Sandholm, T. 2003. Learning Near-Pareto-Optimal Conventions in Polynomial Time. Proceedings of the *17th Neural Information Processing Systems: Natural and Synthetic (NIPS)* conference, Vancouver, Canada, 12/9-12/11/2003. (Acceptance rate 28%.)

459. Larson, K. and Sandholm, T. 2003. Miscomputing ratio: The Social Cost of Selfish Computing. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Melbourne Australia, July. (Acceptance rate 25%.)

460. Hudson, B. and Sandholm, T. 2003. Generalizing Preference Elicitation in Combinatorial Auctions. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Melbourne Australia, July. (Poster paper, acceptance rate 57%.)

461. Conitzer, V. and Sandholm, T. 2003. AWESOME: A General Multiagent Learning Algorithm that Converges in Self-Play and Learns a Best Response Against Stationary Opponents. *International Conference on Machine Learning (ICML)*, pp. 83–90, Washington, DC. (Acceptance rate 32%.)

462. Blum, A., Jackson, J., Sandholm, T., and Zinkevich, M. 2003. Preference Elicitation and Query Learning. *Annual Conference on Learning Theory (COLT).* (Acceptance rate 53%.)

463. Conitzer, V., Lang, J., and Sandholm, T. 2003. How Many Candidates Are Needed to Make Elections Hard to Manipulate? *International Conference on Theoretical Aspects of Reasoning about Knowledge (TARK)*, pp. 201–214, Bloomington, Indiana, June.

464. Sandholm, T. 2003. Terminating Decision Algorithms Optimally. *International Conference on Principles and Practice of Constraint Programming (CP)*, Cork, Ireland. (Poster paper, acceptance rate 45%.) Springer LNCS 2833, pp. 950–955.

465. Conitzer, V. and Sandholm, T. 2003. Automated Mechanism Design: Complexity Results Stemming from the Single-Agent Setting. *International Conference on Electronic Commerce (ICEC)*, Pittsburgh, PA, 9/30/03–10/3/03.

466. Braynov, S. and Sandholm, T. 2003. Auctions with Untrustworthy Bidders. *IEEE Conference on Electronic Commerce*, Newport Beach, CA, June 24–27.

467. Conitzer, V. and Sandholm, T. 2003. Applications of Automated Mechanism Design. *Bayesian Modeling Applications workshop at the International Conference on Uncertainty in Artificial Intelligence (UAI)*, Acapulco, Mexico, August.

468. Sandholm, T. and Gilpin, A. 2003. Sequences of Take-It-Or-Leave-It Offers: Near-Optimal Auctions Without Full Valuation Revelation. *In proceedings of the workshop on Agent-Mediated Electronic Commerce (AMEC V)*, Melbourne, Australia, 7/15/2003.

469. Nareyek, A. and Sandholm, T. 2003. Planning in Dynamic Worlds: More than External Events. *Agents and Automated Reasoning Workshop at the International Joint Conference on Artificial Intelligence (IJCAI)*, pp. 30–35, Acapulco, Mexico, August.

470. Likhodedov, A. and Sandholm, T. 2003. Auction Mechanism for Optimally Trading Off Revenue and Efficiency. *In Proceedings of the workshop on Agent-Mediated Electronic Commerce (AMEC V)*, Melbourne, Australia, 7/15/2003.

471. Conitzer, V. and Sandholm, T. 2003. An Algorithm for Single-Agent Deterministic Automated Mechanism Design without Payments. *Distributed Constraint Reasoning workshop at the International Joint Conference on Artificial Intelligence (IJCAI)*, Acapulco, Mexico, August.

472. Conitzer, V. and Sandholm, T. 2003. Computational Criticisms of the Revelation Principle. *AAMAS-03 workshop on Agent-Mediated Electronic Commerce (AMEC V)*, Melbourne, Australia, 7/15/2003. (Poster paper.)

473. Conitzer, V. and Sandholm, T. 2003. Computing Shapley Values, Manipulating Value Division Schemes, and Checking Core Membership in Multi-Issue Domains. *Distributed Constraint Reasoning workshop at the International Joint Conference on Artificial Intelligence (IJCAI)*, Acapulco, Mexico, August.

474. Sandholm, T., and Wang, X. 2002. (Im)possibility of Safe Exchange Mechanism Design. *National Conference on Artificial Intelligence (AAAI)*, Edmonton, Canada, 7/28-8/1/2002. (Oral track, acceptance rate 6%.)

475. Conitzer, V., and Sandholm, T. 2002. Complexity of Manipulating Elections with Few Candidates. *National Conference on Artificial Intelligence (AAAI)*, Edmonton, Canada, 7/28-8/1/2002. (Oral track, acceptance rate 6%.)

476. Conitzer, V., and Sandholm, T. 2002. Vote Elicitation: Complexity and Strategy-Proofness. *National Conference on Artificial Intelligence (AAAI)*, Edmonton, Canada, 7/28-8/1/2002. (Acceptance rate 26%.)

477. Conen, W., and Sandholm, T. 2002. Partial-Revelation VCG mechanism for Combinatorial Auctions. *National Conference on Artificial Intelligence (AAAI)*, Edmonton, Canada, 7/28-8/1/2002. (Acceptance rate 26%.)

478. Wang, X. and Sandholm, T. 2002. Reinforcement Learning to Play An Optimal Nash Equilibrium in Team Markov Games. Proceedings of the *16th Neural Information Processing Systems: Natural and Synthetic (NIPS)* conference, Vancouver, Canada, 12/9-12/14/2002. (Acceptance rate 30%.)

479. Conitzer, V. and Sandholm, T. 2002. Complexity of Mechanism Design. *18th Conference on Uncertainty in Artificial Intelligence (UAI)*, Edmonton, Canada, 8/1-8/4/2002. (Acceptance rate 34%.)

480. Blum, A., Sandholm, T., and Zinkevich, M. 2002. Online Algorithms for Market Clearing. *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pp. 971–980, San Francisco, CA, January 6-8. (Acceptance rate 39%.)

481. Larson, K., and Sandholm, T. 2002. An Alternating Offers Bargaining Model for Computationally Limited Agents. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Bologna, Italy, 7/15-7/19/2002. (Acceptance rate 26%.)

482. Sandholm, T., Suri, S., Gilpin, A., and Levine, D. 2002. Winner Determination in Combinatorial Auction Generalizations. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Bologna, Italy, 7/15-7/19/2002. (Acceptance rate 26%.)

483. Braynov, S., and Sandholm, T. 2002. Incentive Compatible Trading Mechanism for Trust Revelation. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Bologna, Italy, 7/15-7/19/2002. (Poster paper, acceptance rate 57%.)

484. Larson, K., and Sandholm, T. 2002. Bidders with Hard Valuation Problems. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Bologna, Italy, 7/15-7/19/2002. (Poster paper, acceptance rate 57%.)

485. Conen, W., and Sandholm, T. 2002. Preference Elicitation in combinatorial auctions. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Bologna, Italy, 7/15-7/19/2002. (Poster paper, acceptance rate 57%.)

486. Sandholm, T. and Suri, S. 2002. Optimal Clearing of Supply/Demand Curves. *13th Annual International Symposium on Algorithms and Computation (ISAAC)*, Vancouver, Canada, November. (Acceptance rate 35%.)

487. Larson, K. and Sandholm, T. 2002. Equilibrium Strategies for Bidders with Hard Valuation Problems. *Stanford Institute for Theoretical Economics (SITE) workshop on the Economics of the Internet*, June. (Invited submission; the papers are refereed, but there is no official published proceedings.)

488. Braynov, S. and Sandholm, T. 2002. Trust Revelation in Multiagent Interaction. *CHI (Conference on Human Factors in Computing Systems) Workshop on The Philosophy and Design of Socially Adept Technologies*, Minneapolis, MN.

489. Hudson, B. and Sandholm, T. 2002. Effectiveness of Preference Elicitation in Combinatorial Auctions. Workshop on Agent-Mediated Electronic Commerce.

490. Hudson, B. and Sandholm, T. 2002. Effectiveness of Preference Elicitation in Combinatorial Auctions. *Stanford Institute for Theoretical Economics (SITE) workshop on the Economics of the Internet*, June. (Invited submission; the papers are refereed, but there is no official published proceedings).

491. Smith, T., Sandholm, T., and Simmons, R. 2002. Constructing and Clearing Combinatorial Exchanges Using Preference Elicitation. *AAAI-02 workshop on Preferences in AI and CP: Symbolic Approaches.*

492. Sandholm, T. and Suri, S. 2002. Optimal Clearing of Supply/Demand Curves. *AAAI-02 workshop on Agent-Based Technologies for B2B Electronic Commerce.* (Acceptance rate 50%.)

493. Conen, W. and Sandholm, T. 2002. *Differential*-revelation VCG mechanisms for combinatorial auctions. AAMAS-02 workshop on Agent-Mediated Electronic Commerce.

494. Larson, K. and Sandholm, T. 2002. Miscomputing ratio: The Social Cost of Selfish Computing. *AAAI-02 workshop on Game-Theoretic and Decision-Theoretic Agents.*

495. Longer version: Kothari, A., Sandholm, T., and Suri, S. 2002. Solving Combinatorial Exchanges: Optimality via Few Partial Bids. *AAAI-02 workshop on Artificial Intelligence for Business.* (Paper was reviewed and accepted, but the workshop was canceled.)

496. Conitzer, V. and Sandholm, T. 2002. Complexity of Determining Nonemptiness of the Core. AAMAS-02 workshop on Distributed Constraint Reasoning, Bologna, Italy, July.

497. Conen, W. and Sandholm, T. 2002. Coherent Pricing of Efficient Allocations in Combinatorial Economies. *AAAI-02 workshop on Game-Theoretic and Decision-Theoretic Agents.*

498. Sandholm, T. and Suri, S. 2001. Market Clearability. *International Joint Conference on Artificial Intelligence (IJCAI)*, Seattle, WA, August. (Acceptance rate 24%.)

499. Sandholm, T., Suri, S., Gilpin, A., and Levine, D. 2001. CABOB: A Fast Optimal Algorithm for Combinatorial Auctions. *International Joint Conference on Artificial Intelligence (IJCAI)*, Seattle, WA, August. (Acceptance rate 24%.)

500. Larson, K. and Sandholm, T. 2001. Costly Valuation Computation in Auctions: Deliberation Equilibrium. *Theoretical Aspects of Reasoning about Knowledge (TARK)*, pp. 169–182, Siena, Italy, July. (Acceptance rate 27%.)

501. Conen, W. and Sandholm, T. 2001. Preference Elicitation in Combinatorial Auctions. *ACM Conference on Electronic Commerce (EC)*, pp. 256–259, (poster version), Tampa, FL, October 15–17.

502. Conen, W. and Sandholm, T. 2001. Minimal Preference Elicitation in Combinatorial Auctions. International Joint Conference on Artificial Intelligence (IJCAI), Workshop on Economic Agents, Models, and Mechanisms, Seattle, WA, August 6th. (Acceptance rate 40%.)

503. Sandholm, T. and Suri, S. 2001. Side Constraints and Non-Price Attributes in Markets. International Joint Conference on Artificial Intelligence (IJCAI), Workshop on Distributed Constraint Reasoning, Seattle, WA, August 4th.

504. Sandholm, T., Suri, S., Gilpin, A., and Levine, D. 2001. Winner Determination in Combinatorial Auction Generalizations. International Conference on Autonomous Agents, Workshop on Agent-based Approaches to B2B, pp. 35–41, Montreal, Canada, May 28th.

505. Larson, K. and Sandholm, T. 2001. Computationally Limited Agents in Auctions. International Conference on Autonomous Agents, Workshop on Agent-based Approaches to B2B, pp. 27–34, Montreal, Canada, May 28th.

506. Sandholm, T. and Suri, S. 2000. Improved Algorithms for Optimal Winner Determination in Combinatorial Auctions and Generalizations. *National Conference on*

Artificial Intelligence (AAAI), pp. 90–97, Austin, TX, July 31–August 2. (Acceptance rate 33%.)

507. Larson, K. and Sandholm, T. 2000. Deliberation in Equilibrium: Bargaining in Computationally Complex Problems. *National Conference on Artificial Intelligence (AAAI)*, pp. 48–55, Austin, TX, July 31–August 2. (Acceptance rate 33%.)

508. Sandholm, T. and Ferrandon, V. 2000. Safe Exchange Planner. *International Conference on Multi-Agent Systems (ICMAS)*, pp. 255–262, Boston, MA, July 7–12. (Acceptance rate 19%.)

509. Sandholm, T. and Zhou, Y. 2000. Surplus Equivalence of Leveled Commitment Contracts. *International Conference on Multi-Agent Systems (ICMAS)*, pp. 247–254, Boston, MA, July 7–12. (Acceptance rate 19%.)

510. Braynov, S. and Sandholm, T. 2000. Reasoning About Others: Representing and Processing Infinite Belief Hierarchies. *International Conference on Multi-Agent Systems (ICMAS)*, pp. 71–78, Boston, MA, July 7–12. (Acceptance rate 19%.)

511. Sandholm, T. 2000. *eMediator*: A Next Generation Electronic Commerce Server. *International Conference on Autonomous Agents (AGENTS)*, Barcelona, Spain, June 3–8. (Acceptance rate 24%.)

512. Andersson, M. and Sandholm, T. 2000. Contract Type Sequencing for Reallocative Negotiation. *International Conference on Distributed Computing Systems (ICDCS)*, Taipei, Taiwan, April.

513. Larson, K. and Sandholm, T. 2000. Deliberation in Equilibrium: Bargaining in Computationally Complex Problems. *First World Congress of the Game Theory Society (GAMES)*, Bilbao, Spain, July 24–28. (This conference is reviewed based on extended abstracts, and does not have proceedings.)

514. Sandholm, T. and Suri, S. 2000. Improved Algorithms for Optimal Winner Determination in Combinatorial Auctions and Generalizations. *First World Congress of the Game Theory Society (GAMES)*, Bilbao, Spain, July 24–28. (This conference is reviewed based on extended abstracts, and does not have proceedings.)

515. Suri, S., Sandholm, T. and Warkhede, P. 2000. Optimal Flow Aggregation. *Seventh Scandinavian Workshop on Algorithm Theory (SWAT)*, Bergen, Norway, July 5–7.

516. Sandholm, T. 1999. An Algorithm for Optimal Winner Determination in Combinatorial Auctions. *International Joint Conference on Artificial Intelligence (IJCAI)*, pp. 542–547, Stockholm, Sweden, August. (Acceptance rate 26%.)

517. Sandholm, T., Sikka, S. and Norden, S. 1999. Algorithms for Optimizing Leveled Commitment Contracts. *International Joint Conference on Artificial Intelligence (IJCAI)*, pp. 535–540, Stockholm, Sweden, August. (Acceptance rate 26%.)

518. Sandholm, T. and Vulkan, N. 1999. Bargaining with Deadlines. *National Conference on Artificial Intelligence (AAAI)*, pp. 44–51, Orlando, FL, July. (Acceptance rate 27%.)

519. Andersson, M. and Sandholm, T. 1999. Time-Quality Tradeoffs in Reallocative Negotiation with Combinatorial Contract Types. *National Conference on Artificial Intelligence (AAAI)*, pp. 3–10, Orlando, FL, July. (Acceptance rate 27%.)

520. Braynov, S. and Sandholm, T. 1999. Power, Dependence and Stability in Multiagent Plans. *National Conference on Artificial Intelligence (AAAI)*, pp. 11–16, Orlando, FL, July. (Acceptance rate 27%.)

521. Braynov, S. and Sandholm, T. 1999. Contracting with Uncertain Level of Trust. *ACM Conference on Electronic Commerce (EC)*, pp. 15–21, Denver, CO, November. (Acceptance rate 29%.)

522. Larson, K. and Sandholm, T. 1999. Anytime Coalition Structure Generation: An Average Case Study. *Third International Conference on Autonomous Agents (AGENTS)*, pp. 40–47, Seattle, WA, May. (Acceptance rate 29%.)

523. Braynov, S. and Sandholm, T. 1999. Contracting with Uncertain Level of Trust. *Deception, Fraud and Trust in Agent Societies Workshop at the Third International Conference on Autonomous Agents (AGENTS)*, pp. 29–40, Seattle, WA, May 1.

524. Huai, Q. and Sandholm, T. 1999. Mobile Agents in an Electronic Auction House. *Mobile Agents in the Context of Competition and Cooperation (MAC3) Workshop at the Third International Conference on Autonomous Agents (AGENTS)*, pp. 24–33, Seattle, WA, May 1.

525. Sandholm, T. 1999. *eMediator*: A Next Generation Electronic Commerce Server. *AAAI Workshop on AI for Electronic Commerce*, Orlando, FL, July. AAAI Workshop Technical Report WS-99-01, pp. 46-55.

526. Sandholm, T. and Zhou, Y. 1999. Revenue Equivalence of Leveled Commitment Contracts. *AAAI Workshop on Negotiation: Settling Conflicts and Identifying Opportunities*, Orlando, FL, July. AAAI Workshop Technical Report WS-99-12, pp. 38-43.

527. Sandholm, T. and Vulkan, N. 1999. Bargaining with Deadlines. *Fifth European Conference on Symbolic and Quantitative Approaches to Reasoning with Uncertainty, Workshop on Decision Theoretic and Game Theoretic Agents*. University College London (UCL), London, England, July 5-6.

528. Braynov, S. and Sandholm, T. 1999. Auctions without Common Knowledge. *IJCAI Workshop on Agent-Mediated Electronic Commerce*, Stockholm, Sweden, August, pp. 1-12.

529. Braynov, S. and Sandholm, T. 1999. Auctions without Common Knowledge. Extended abstract. *AAAI Workshop on AI for Electronic Commerce*, Orlando, FL, July. AAAI Workshop Technical Report WS-99-01, pp. 109-110.

530. Sandholm, T., Shehory, O., Andersson, M., Larson, K., and Tohmé, F. 1998. Anytime Coalition Structure Generation with Worst Case Guarantees. *Proceedings of the Fifteenth National Conference on Artificial Intelligence (AAAI)*, pp. 46–53, Madison, WI, July. (Acceptance rate 30%.)

531. Andersson, M. and Sandholm, T. 1998. Leveled Commitment Contracts with Myopic and Strategic Agents. *Proceedings of the Fifteenth National Conference on Artificial Intelligence (AAAI)*, pp. 38–45, Madison, WI, July. (Acceptance rate 30%.)

532. Andersson, M. and Sandholm, T. 1998. Leveled Commitment Contracting among Myopic Individually Rational Agents. *Proceedings of the Third International Conference on Multiagent Systems (ICMAS)*, pp. 26–33, Paris, France, July. (Acceptance rate 23%.)

533. Sandholm, T. 1998. Contract Types for Satisficing Task Allocation: I Theoretical Results. *AAAI Spring Symposium: Satisficing Models*, Stanford University, California, March 23–25.

534. Andersson, M. and Sandholm, T. 1998. Contract Types for Satisficing Task Allocation: II Experimental Results. *Working Notes of the AAAI 1998 Spring Symposium: Satisficing Models*, Stanford University, California, March 23–25.

535. Andersson, M. and Sandholm, T. 1998. Leveled Commitment Contracts with Myopic and Strategic Agents. *Second International Conference on Autonomous Agents (AGENTS), Workshop on Agent Societies and Computational Markets (ASCMA)*, Minneapolis, MN, May.

536. Andersson, M. and Sandholm, T. 1998. Sequencing of Contract Types for Anytime Task Reallocation. *Second International Conference on Autonomous Agents (AGENTS), Workshop on Agent-Mediated Electronic Trading (AMET)*, Minneapolis, MN, May.

537. Sandholm, T. and Ygge, F. 1997. On the Gains and Losses of Speculation in Equilibrium Markets. *Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence (IJCAI)*, pp. 632–638, Nagoya, Japan, August. (Acceptance rate 24%.)

538. Sandholm, T. 1997. Necessary and Sufficient Contract Types for Optimal Task Allocation. *Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence (IJCAI)*, Nagoya, Japan. Poster session abstracts, pp. 87, Nagoya, Japan, August. (Acceptance rate 47% for posters.)

539. Tohmé, F. and Sandholm, T. 1997. Coalition Formation Processes with Belief Revision among Bounded Rational Self-Interested Agents. Fifteenth International Joint Conference on Artificial Intelligence (IJCAI), Workshop on Social Interaction and Communityware, pp. 43–51, Nagoya, Japan, August 25.

540. Sandholm, T. and Lesser, V. 1996. Advantages of a Leveled Commitment Contracting Protocol. *Proceedings of the Thirteenth National Conference on Artificial Intelligence (AAAI)*, pp. 126–133, Portland, OR, August. (Acceptance rate 31%.)

541. Sandholm, T. 1996. A Second Order Parameter for 3SAT. *Proceedings of the Thirteenth National Conference on Artificial Intelligence (AAAI)*, pp. 259–265, Portland, OR, August. (Acceptance rate 31%.)

542. Sandholm, T. 1996. Limitations of the Vickrey Auction in Computational Multiagent Systems. *Proceedings of the Second International Conference on Multiagent Systems (ICMAS)*, pp. 299–306, Keihanna Plaza, Kyoto, Japan, December. (Acceptance rate 28%.)

543. Sandholm. T., Brodley, C., Vidovic, A. and Sandholm, M. 1996. Comparison of Regression Methods, Symbolic Induction Methods and Neural Networks in Morbidity Diagnosis and Mortality Prediction in Equine Gastrointestinal Colic. *AAAI Spring Symposium: Artificial Intelligence in Medicine: Applications of Current Technologies*, pp. 154–159, Stanford University, California. *American Association for Artificial Intelligence Technical Report.*

544. Sandholm, M., Sandholm. T., Brodley, C., and Vidovic, A. 1996. Linear and logistic regression, symbolic induction methods, and neural networks in morbidity diagnosis and mortality prediction in equine gastrointestinal colic: An extended abstract. *The Second Annual SEPSIS/SIRS Conference: Reducing Mortality to Patients & Suppliers*, Washington, D.C. Poster.

545. Sandholm, T. and Lesser, V. 1995. Coalition Formation among Bounded Rational Agents. *Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence (IJCAI)*, pp. 662–669, Montreal, Canada, August. (Acceptance rate 22%.)

546. Sandholm, T. and Lesser, V. 1995. Equilibrium Analysis of the Possibilities of Unenforced Exchange in Multiagent Systems. *Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence (IJCAI)*, pp. 694–701, Montreal, Canada, August. (Acceptance rate 22%.)

547. Sandholm, T. and Lesser, V. 1995. Issues in Automated Negotiation and Electronic Commerce: Extending the Contract Net Framework. *Proceedings of the First International Conference on Multiagent Systems (ICMAS)*, pp. 328–335, San Francisco, California, June. (Acceptance rate 33%.)

548. Sandholm, T. and Lesser, V. 1995. On Automated Contracting in Multi-enterprise Manufacturing. *Proceedings of the "Improving Manufacturing Performance in a Distributed Enterprise: Advanced Systems and Tools" Conference*, pp. 33–42, Edinburgh, Scotland.

549. Sandholm, T. and Crites, R. 1995. On Multiagent Q-Learning in a Semi-competitive Domain. *Working Notes of the Fourteenth International Joint Conference on Artificial*

Intelligence (IJCAI) Workshop on Adaptation and Learning in Multiagent Systems, pp. 71–77, Montreal, Canada.

550. Neiman, D., Hildum, D., Lesser, V. and Sandholm, T. 1994. Exploiting Meta-Level Information in a Distributed Scheduling System. *Proceedings of the Twelfth National Conference on Artificial Intelligence (AAAI)*, pp. 394–400, Seattle, Washington, July–August. (Acceptance rate 31%.)

551. Sandholm, T. and Lesser, V. 1994. Utility-Based Termination of Anytime Algorithms. *Proceedings of the European Conference on Artificial Intelligence (ECAI) Workshop on Decision Theory for DAI Applications*, pp. 88–99, Amsterdam, The Netherlands.

552. Sandholm, T. 1994. A New Order Parameter for 3SAT. *Proceedings of the Twelfth National Conference on Artificial Intelligence (AAAI) Workshop on Experimental Evaluation of Reasoning and Search Methods*, pp. 57–63, Seattle, Washington.

553. Sandholm, T. and Lesser, V. 1994. An Exchange Protocol without Enforcement. *Proceedings of the Thirteenth International Workshop on Distributed Artificial Intelligence (DAI)*, pp. 305–319, Seattle, Washington.

554. Sandholm, T. 1993. An Implementation of the Contract Net Protocol Based on Marginal Cost Calculations. *Proceedings of the Eleventh National Conference on Artificial Intelligence (AAAI)*, pp. 256–262, Washington DC, July. (Acceptance rate 24%.)

555. Sandholm, T. 1993. An Implementation of the Contract Net Protocol Based on Marginal Cost Calculations. *Proceedings of the Twelfth International Workshop on Distributed Artificial Intelligence (DAI)*, pp. 295–308, Hidden Valley, Pennsylvania.

556. Sandholm, T. 1992. Automatic Cooperation of Area-Distributed Dispatch Centers in Vehicle Routing. *Proceedings of the International Conference on Artificial Intelligence Applications in Transportation Engineering*, pp. 449–467, San Buenaventura, California.

557. Sandholm, T. 1992. A Bargaining Network for Intelligent Agents. *Proceedings of the Finnish Artificial Intelligence Conference (STeP), New Directions in Artificial Intelligence*, Vol. 3, pp. 173–181, Espoo, Finland.

558. Linnainmaa, S., Jokinen, O., Sandholm, T. and Vepsalainen, A. M. 1992. Advanced Computer Supported Vehicle Routing for Heavy Transports. *Proceedings of the Finnish Artificial Intelligence Conference (STeP), New Directions in Artificial Intelligence*, Vol. 3, pp. 163–172, Espoo, Finland.

559. Sandholm, T. 1991. A Strategy for Decreasing the Total Transportation Costs Among Area-Distributed Transportation Centers. *Proceedings of the "Nordic Operations Analysis in Cooperation (NOAS): OR in Business" Conference*, Turku, Finland.

BOOKS AND EDITED COLLECTIONS

1. Sandholm, T., Riedl, J., and Fortnow, L., editors. 2008. Proceedings of the 2008 ACM Conference on Electronic Commerce (EC).

2. Anandalingam, A., Kalagnanam, J., Parkes, D., Rothkopf, M., and Sandholm, T., editors. 2005. Special Issue on Electronic Markets, volume 51(3) of *Management Science*.

3. Rosenschein, J., Sandholm, T., Wooldridge, M., and Yokoo, M., editors. 2003. Proceedings of the Second International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS). ACM.

4. Aho, J., Arppe, A., Henrikson, M., Hintsa, J., Hyppönen, A., Jouppi, J ., Linnanen, L., Luhtala, M., Läärä, M., Matero, S., Pankakoski, J., Pulli, V., Rahikainen, S., Sandholm, T., editors. 1991. *The Innovative Enterprise*. Prodeko Publications, Espoo, Finland.

CHAPTERS IN BOOKS

1. Sandholm, T. 2026. The State of Representing and Solving Games. Invited paper from *Nobel Symposium* "100 Years of Game Theory", Stockholm, Sweden, December 17–19, 2021. In the book "One Hundred Years of Game Theory: A Nobel Symposium" (eds. Mark Voorneveld et al.), Cambridge University Press, Econometric Society Monographs series.

2. Sandholm, T. 2015. Steering Evolution and Biological Adaptation Strategically: Computational Game Theory and Opponent Exploitation for Treatment Planning, Drug Design, and Synthetic Biology. 3-page vision paper in the CSD50 commemorative volume to celebrate the 50th birthday of the Computer Science Department at Carnegie Mellon University.

3. Sandholm, T. 2013. Very-Large-Scale Generalized Combinatorial Multi-Attribute Auctions: Lessons from Conducting $60 Billion of Sourcing. Chapter 16 in *The Handbook of Market Design*, edited by Nir Vulkan, Alvin E. Roth, and Zvika Neeman, Oxford University Press.

4. Sandholm, T. 2008. Computing in Mechanism Design. In *The New Palgrave Dictionary of Economics*, Second Edition. Edited by Steven N. Durlauf and Lawrence E. Blume. The New Palgrave Dictionary of Economics won the 2008 Prose award for the Best Multi-Volume Reference Work in the Humanities and Social Sciences. The Dictionary was also a finalist and received an honorable mention in the Best eProduct category. The Prose Awards are judged annually by the Professional and Scholarly Publishing (PSP) Division of the Association of American Publishers (AAP).

5. Sandholm, T. 2006. Chapter 14: *Optimal Winner Determination Algorithms.* In the textbook *Combinatorial Auctions*, Cramton, Steinberg, Shoham, editors, MIT Press, pages 337–368.

6. Sandholm, T. and Boutilier, C. 2006. Chapter 10: *Preference Elicitation in Combinatorial Auctions.* In the textbook *Combinatorial Auctions*, Cramton, Steinberg, Shoham, editors, MIT Press, pages 233–263.

7. Mueller, R, Lehmann, D., and Sandholm, T. 2006. Chapter 12: *The Winner Determination Problem.* In the textbook *Combinatorial Auctions*, Cramton, Steinberg, Shoham, editors, MIT Press, pages 297–317.

8. Larson, K. and Sandholm, T. 2006. Designing Auctions for Deliberative Agents. In Springer Verlag Lecture Notes in Computer Science (LNCS/LNAI) volume 3435, pp. 87–100, revised selected papers from the AMEC-04 workshop.

9. Brandt, F. and Sandholm, T. 2006. On Correctness and Privacy in Distributed Mechanisms. In Springer Verlag Lecture Notes in Computer Science (LNAI 3937), pp. 212–225. (Book chapter version of our AMEC-04 workshop paper.)

10. Yokoo, M., Conitzer, V., Sandholm, T., Ohta, N., and Iwasaki, A. 2006. A New Solution Concept for Coalitional Games in Open Anonymous Environments. Springer Lecture Notes in Computer Science (LNCS) 4012. (Mainly a post-proceedings of the workshops jointly held with JSAI and the best paper award winners from JSAI.)

11. Conitzer, V. and Sandholm, T. 2005. Revenue failures and collusion in combinatorial auctions and exchanges with VCG payments. In Springer Verlag Lecture Notes in Computer Science (LNAI 3435), pp. 1–14, revised selected papers from the AMEC-04 workshop.

12. Gilpin, A. and Sandholm, T. 2005. Arbitrage in Combinatorial Exchanges. In Springer Verlag Lecture Notes in Computer Science (LNCS/LNAI), revised selected papers from the AMEC-04 workshop.

13. Brandt, F. and Sandholm, T. 2005. Efficient Privacy-Preserving Protocols for Multi-Unit Auctions. In Springer Lecture Notes in Computer Science LNCS 3570. Post-conference proceedings of the FC-05 conference.

14. Sandholm, T. and Gilpin, A. 2004. Sequences of Take-It-Or-Leave-It Offers: Near-Optimal Auctions Without Full Valuation Revelation. *Springer Verlag Lecture Notes in Computer Science (LNCS/LNAI)*, volume 3048, revised selected papers from the AMEC-03 workshop, pp. 73–91.

15. Likhodedov, A. and Sandholm, T. 2004. Mechanism for Optimally Trading Off Revenue and Efficiency in Multi-unit Auctions. *Springer Verlag Lecture Notes in Computer Science (LNCS/LNAI)*, volume 3048, revised selected papers from the AMEC-03 workshop, pp. 92–108.

16. Hudson, B. and Sandholm, T. 2002. Effectiveness of Preference Elicitation in Combinatorial Auctions. Springer Verlag Lecture Notes in Computer Science (LNCS/LNAI 2531): Agent-Mediated Electronic Commerce IV: Designing Mechanisms and Systems. Padget, Parkes, Sadeh, Shehory, and Walsh (editors).

17. Conen, W. and Sandholm, T. 2002. *Differential*-revelation VCG mechanisms for combinatorial auctions. Springer Verlag Lecture Notes in Computer Science (LNCS/LNAI 2531): Agent-Mediated Electronic Commerce IV: Designing Mechanisms and Systems, pp. 34–51. Padget, Parkes, Sadeh, Shehory, and Walsh (editors).

18. Andersson, M. and Sandholm, T. 1999. Sequencing of Contract Types for Anytime Task Reallocation. In *Agent-Mediated Electronic Trading*, Carles Sierra (ed.). Springer Verlag Lecture Notes in Artificial Intelligence 1571, pp. 54–69.

19. Sandholm, T. 1999. Distributed Rational Decision Making. In the textbook *Multiagent Systems: A Modern Introduction to Distributed Artificial Intelligence*, Weiß, G., ed., MIT Press, pp. 201–258.

20. Sandholm, T. 1998. Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation. In *Cooperative Information Agents*, Klusch, M., ed., Lecture Notes in Artificial Intelligence, Vol. 1435, Springer Verlag, pp. 113–134.

21. Sandholm, T. and Lesser, V. 1997. Issues in Automated Negotiation and Electronic Commerce: Extending the Contract Net Framework. In *Readings in Agents*, Huhns, M. and Singh, M. (eds.), Morgan Kaufmann Publishers, pp. 66–73.

22. Sandholm, T. and Crites, R. 1996. On Multiagent Q-Learning in a Semi-competitive Domain. In *Adaptation and Learning in Multi-Agent Systems*, Weiß, G. and Sen, S., eds. Lecture Notes in Artificial Intelligence 1042 of Lecture Notes in Computer Science, Springer-Verlag, pp. 191–205.

23. Honkela, T. and Sandholm, T. 1993. Machine Learning. In the *Finnish Encyclopedia of Artificial Intelligence*, Eero Hyvönen, ed., pp. 244–255.

24. Sandholm, T. 1991. Solving the 1-Dimensional Fractal Inverse Problem with a Genetic Algorithm. In *Genetic Algorithms*, Jarmo T. Alander, ed., pp. 126–132, Publications of the Helsinki University of Technology.

LIGHTLY REFEREED AND UNREFEREED CONFERENCES AND WORKSHOPS

1. Sandholm, T. 2019. New Results for Solving Imperfect-Information Games. *International Florida Artificial Intelligence Research Society Conference (FLAIRS)*. Abstract of my invited Keynote Talk.

2. Brown, N., Sandholm, T., and Amos, B. 2018. Depth-limited Solving in Imperfect-information Games. *INFORMS Annual Meeting.*

3. Kroer, C., Farina, G., and Sandholm, T. 2017. Smoothing Method for Approximate Extensive-Form Perfect Equilibrium. Poster at the *ACM Conference on Economics and Computation (EC).*

4. Balcan, N., Sandholm, T., and Vitercik, E. 2017. Sample Complexity of Multi-Item Profit Maximization. Poster at the *ACM Conference on Economics and Computation (EC).*

5. Safe and Nested Subgame Solving for Imperfect-Information Games. 2017. *INFORMS Annual Meeting*, Houston, TX, October 22–25.

6. Sandholm, T., Farina, G., Kroer, C., Morel, P., and Faeder, J. Sequential Planning for Steering Immune System Adaptation. Poster. *Joint CompBio—Immunology Department Retreat*, Pittsburgh, PA, 6/7/2017.

7. Kroer, C., Kilinç-Karzan, F., Waugh, K., and Sandholm, T. 2016. Better Bounds On Convergence Rates For First-order Methods In Sequential Games *INFORMS Annual Meeting*, Nashville, TN, November 13–16.

8. Kroer, C. and Sandholm, T. Sequential Planning for Steering Immune System Adaptation. 2016. *INFORMS Annual Meeting*, Nashville, TN, November 13–16.

9. Nguyen, T. and Sandholm, T. 2016. Optimizing Prices in Descending Clock Auctions: An Application to the US Incentive Auctions. *International Symposium on Combinatorial Optimisation (ISCO)*, Kent Business School, University of Kent, Canterbury, UK. Talk abstract.

10. Brown, N. and Sandholm, T. 2016. Regret-Based Pruning in Extensive-Form Games. Poster at the *ACM Conference on Economics and Computation (EC).*

11. Dickerson, J., Plaut, B., Manlove, D., Sandholm, T., and Trimble, J. 2016. Position-Indexed Formulations for Kidney Exchange. *European Conference on Operational Research (EURO)*, Poznan, Poland.

12. Dickerson, J., Kazachkov, A., Procaccia, A., and Sandholm, T. 2016. Small Representations of Big Kidney Exchange Graphs. *European Conference on Operational Research (EURO)*, Poznan, Poland.

13. Dickerson, J., Plaut, B., and Sandholm, T. 2016. Fast Optimal Clearing of Capped-chain Barter Exchanges. *INFORMS Optimization Society conference (IOS)*, Princeton, NJ.

14. Ganzfried, S. and Sandholm, T. 2015. Endgame Solving in Large Imperfect-Information Games. Poster at the *ACM Conference on Economics and Computation (EC).*

15. Das, S., Dickerson, J., Li, Z., and Sandholm, T. 2015. Competing Dynamic Matching Markets. Poster at the *ACM Conference on Economics and Computation (EC)*.

16. Brown, N. and Sandholm, T. 2015. Simultaneous Abstraction and Equilibrium Finding in Games. Poster at the *ACM Conference on Economics and Computation (EC)*.

17. Brown, N., Ganzfried, S., and Sandholm, T. 2015. Claudico and the first heads-up no-limit Texas Hold'em man-machine match. *INFORMS Annual Meeting*, Philadelphia, PA, November 1–4. Contributed talk.

18. Dickerson, J. and Sandholm, T. 2015. The Dynamics of Kidney Exchange. *INFORMS Annual Meeting*, Philadelphia, PA, November 1–4. Contributed talk given by my student John Dickerson.

19. Ganzfried, S. and Sandholm, T. 2015. Endgame Solving in Large Imperfect-Information Games. *INFORMS Annual Meeting*, Philadelphia, PA, November 1–4. Contributed talk given by my student Sam Ganzfried.

20. Kroer, C. and Sandholm, T. 2015. Discretization Of Continuous Action Spaces In Extensive-form Games. *INFORMS Annual Meeting*, Philadelphia, PA, November 1–4. Contributed talk given by my student Christian Kroer.

21. Yin, Z., Jiang, A., Tambe, M., Kietkintveld, C., Leyton-Brown, K., Sandholm, T., and Sullivan, J. 2012. TRUSTS: Scheduling Randomized Patrols for Fare Inspection in Transit Systems. *Society For Risk Analysis Annual Meeting* abstract, San Francisco, California, December 9-12.

22. Tang, P. and Sandholm, T. 2012. Approximating optimal combinatorial auctions for complements using restricted welfare maximization. Poster at the *ACM Conference on Electronic Commerce (EC)*, Valencia, Spain, June 4–8.

23. Ganzfried, S., Sandholm, T., and Waugh, K. 2012. Strategy Purification and Thresholding: Effective Non-Equilibrium Approaches for Playing Large Games. Poster at the *ACM Conference on Electronic Commerce (EC)*, Valencia, Spain, June 4–8.

24. Tang, P. and Sandholm, T. 2012. Optimal Auctions for Spiteful Bidders. Poster at the *ACM Conference on Electronic Commerce (EC)*, Valencia, Spain, June 4–8.

25. Gilpin, A., Peña, J., and Sandholm, T. 2010. First-order algorithm with $O(log(1/\epsilon))$ convergence for ϵ-equilibrium in two-person zero-sum games. *Modern Trends in Optimization and Its Application: Workshop 2: Numerical Methods for Continuous Optimization*, University of California Los Angeles, October 11–15.

26. Sandholm, T. 2008. Expressiveness in mechanisms and its relation to efficiency: Our experience from $40 billion of combinatorial multi-attribute auctions, and recent theory. DIMACS - LAMSADE workshop on Algorithmic Decision Theory, Paris, France, October 28–31. Extended abstract corresponding to an invited plenary talk, 6 pages.

27. Sandholm, T. 2008. Expressiveness in mechanisms and its relation to efficiency: Our experience from $40 billion of combinatorial multi-attribute auctions, and recent theory. 2nd International Workshop on Computational Social Choice (COMSOC), Liverpool, UK, September 3–5. Extended abstract corresponding to an invited plenary talk, 6 pages.

28. Gilpin, A., Hoda, S., Peña, J., and Sandholm, T. 2008. Algorithms for computing Nash equilibria of large sequential games. Presented at the Workshop on Optimization at the *Foundations of Computational Mathematics Conference (FoCM)*, Hong Kong, June 24–26.

29. Sandholm, T. 2007. Expressive Commerce and Its Application to Sourcing: How We Conducted $35 Billion of Generalized Combinatorial Auctions. *International Conference on Electronic Commerce (ICEC)*, abstract of keynote talk, pp. 349–350, Minneapolis, MN.

30. Abraham, D., Blum, A., and Sandholm, T. 2007. Clearing Algorithms for Barter Exchange Markets: Enabling Nationwide Kidney Exchanges. Abstracts Collection of Dagstuhl Seminar on "Computational Issues in Social Choice", October 22–25. Dagstuhl Seminar Proceedings 07431.

31. Sandholm, T. and Shields, R. 2006. Nogood learning for mixed integer programming. *Workshop on hybrid methods and branching rules in combinatorial optimization*, Concordia University, Canada, September 18–22, 2006. Extended version appeared as:

32. Gilpin, A. and Sandholm, T. 2006. Information-theoretic approaches to branching in search. *Workshop on hybrid methods and branching rules in combinatorial optimization*, Concordia University, Canada, September 18–22, 2006.

33. Conitzer, V. and Sandholm, T. 2005. Expressive Negotiation over Donations to Charities. Dagstuhl seminar on Computing and Markets, Dagstuhl proceedings 05011, Schloss Dagstuhl, Germany, January 3–7.

34. Lehmann, D., Mueller, R., and Sandholm, T. 2005. Computing and Markets. Dagstuhl summary. Dagstuhl seminar proceedings 05011, Computing and Markets, Schloss Dagstuhl, Germany, January 3–7, 2005.

35. Lehmann, D., Mueller, R., and Sandholm, T. 2005. Dagstuhl abstract collection. Dagstuhl seminar proceedings 05011, Computing and Markets, Schloss Dagstuhl, Germany, January 3–7, 2005.

36. Sandholm, T. 2005. Automated Mechanism Design. Dagstuhl seminar on Computing and Markets, Dagstuhl proceedings 05011, Schloss Dagstuhl, Germany, January 3–7, 2005. Invited.

37. Brandt, F., Sandholm, T., and Shoham, Y. 2005. Spiteful Bidding in Sealed-Bid Auctions. Dagstuhl seminar on Computing and Markets, Dagstuhl proceedings 05011, Schloss Dagstuhl, Germany, January 3–7, 2005. Invited.

38. Sandholm, T. and Gilpin, A. 2005. Sequences of Take-It-Or-Leave-It Offers: Near-Optimal Auctions Without Full Valuation Revelation. Dagstuhl seminar on Computing and Markets, Dagstuhl proceedings 05011, Schloss Dagstuhl, Germany, January 3–7, 2005. Invited.

39. Sandholm, T. 2003. Automated Mechanism Design: A New Application Area for Search Algorithms. *In Proceedings of the International Conference on Principles and Practice of Constraint Programming (CP).* Cork, Ireland, 9/29–10/3/2003. Writeup of an invited talk. Springer LNCS 2833, pp. 19–36.

40. Larson, K. and Sandholm, T. 2002. Equilibrium Strategies for Bidders with Hard Valuation Problems. *Dagstuhl seminar on Electronic Market Design*, 6/9–6/14.

41. Sandholm, T. 1999. Leveled Commitment Contracts: New Results. *Workshop on Agents for Electronic Commerce and Managing the Internet-Enabled Supply Chain at the Third International Conference on Autonomous Agents (AGENTS)*, Seattle, Washington, May 1. 3-page extended abstract of an invited talk.

42. Sandholm, T. 1998. Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation. *Proceedings of the Third International Conference on Multiagent Systems (ICMAS)*, pp. 10–11, Paris, France. Extended abstract of invited plenary talk.

43. Sandholm, T. 1998. Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation. *Agents, Alife and Computational Economics Workshop.* Hewlett Packard Labs, Bristol, UK, June 24-25. 23 pages.

44. Sandholm, T. 1998. Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation. *Second International Workshop on Cooperative Information Agents (CIA): Learning, Mobility and Electronic Commerce for Information Discovery in the Internet.* Invited paper. Cite de Sciences - La Vilette, Paris, France, July 3–8. 22 pages.

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TECHNICAL REPORTS

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3. Martin, C. and Sandholm, T. 2022. Finding mixed-strategy equilibria of continuous-action games without gradients using randomized policy networks. *arXiv*.

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5. Balcan, N., Prasad, S., Sandholm, T., and Vitercik, E. 2022. Improved Learning Bounds for Branch-and-Cut. *arXiv*.

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5. Ganzfried, S., Gilpin, A., Sandholm, T., and Sørensen, T. 2009. Advances in Solving Large Imperfect-Information Games, with Benchmarking on Texas Hold'em Poker. Poster at the *International Conference for High Performance Computing, Networking, Storage, and Analysis (SC)*, Pittsburgh Supercomputing Center booth (#1501), Portland, OR, November 14-20.

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7. Gilpin, A. and Sandholm, T. 2007. Modern poker AI: Automated abstraction and equilibrium-finding algorithms. *The Intelligent Gambler*, p. 7–8, Number 28, Winter 2007/8. 26(4), 92. Brief invited vision statement for the 25th anniversary issue of the American Association for Artificial Intelligence.

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14. Sandholm, T. 1992. Introduction to the Logistics Workshop. *Proceedings of the Finnish Artificial Intelligence Conference (STeP), New Directions in Artificial Intelligence*, Vol. 3, pp. 147-148, Espoo, Finland.

15. Sandholm, T. 1991. Automatic Cooperation of Dispatch Centers in Vehicle Routing. *M.S. Thesis, Helsinki University of Technology, Industrial Engineering and Management Science*, Espoo, Finland.

REFEREED DEMONSTRATIONS

1. Brown, N. and Sandholm, T. 2017. *Libratus*: Beating Top Humans in No-Limit Poker. *Neural Information Processing Systems (NIPS)*. Reviewed demonstration. (Acceptance rate 43%)

2. Brown, N. and Sandholm, T. 2017. *Libratus*: The Superhuman AI for No-Limit Poker. *International Joint Conference on Artificial Intelligence (IJCAI)*. Reviewed demonstration and reviewed 3-page paper corresponding to the demonstration. (Acceptance rate 29%)

3. Brown, N. and Sandholm, T. 2016. *Baby Tartanian8*: Winning Agent from the 2016 Annual Computer Poker Competition. *International Joint Conference on Artificial Intelligence (IJCAI)*. Reviewed demonstration and reviewed 2-page paper corresponding to the demonstration.

4. Brown, N. and Sandholm, T. 2015. *Claudico*: The World's Strongest No-Limit Texas Hold'em Poker AI. *Neural Information Processing Systems (NIPS)*.

5. Brown, N., Ganzfried, S., and Sandholm, T. 2015. *Tartanian7*: A Champion Two-Player No-Limit Texas Holdem Poker-Playing Program. *AAAI Conference on Artificial Intelligence (AAAI)*, Austin, TX. Reviewed demonstration and reviewed 2-page paper corresponding to the demonstration.

6. Gilpin, A. and Sandholm, T. 2008. A heads-up no-limit Texas Hold'em poker player: Discretized betting models and automatically generated equilibrium-finding programs. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Estoril, Portugal, May. 2 pages in the AAMAS proceedings. In addition to the demonstration, involved the presentation of two posters:

    - A heads-up no-limit Texas Hold'em poker player: Discretized betting models and automatically generated equilibrium-finding programs.
    - Potential-aware automated abstraction of sequential games, and holistic equilibrium analysis of Texas Holdem poker.

7. Gilpin, A. and Sandholm, T. 2006. A Texas Hold'em Poker player based on automated abstraction and real-time equilibrium computation. At the *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), Demonstration Track*, Hakodate, Japan, May. 2 pages in the AAMAS proceedings.

8. Gilpin, A. and Sandholm, T. 2005. Optimal Rhode Island Hold'em Poker. At the *National Conference on Artificial Intelligence (AAAI), Intelligent Systems Demonstration Program*, Pittsburgh, PA, July. AAAI proceedings pp. 1684–1685.

9. Sandholm, T. 1999. *eMediator*: A Next Generation Electronic Commerce Server. At the *National Conference on Artificial Intelligence (AAAI), Intelligent Systems Demonstration Program*, Orlando, FL, July. AAAI proceedings pp. 923-924.

MAJOR INVITED DEMONSTRATIONS

1. USMC visit and live USMC Colonels vs Strategy Robot AI competition in simulated armored combat, Pittsburgh, PA, 9/14/2022.

2. Brown, N. and Sandholm, T. 2019. *Pluribus*: Superhuman AI for Multiplayer Poker. Demonstration in the Facebook booth at the *Neural Information Processing Systems (NeurIPS)* conference.

3. Brown, N. and Sandholm, T. 2019. *Libratus*: Beating Top Humans in No-Limit Poker. Invited large-scale plenary demonstration. Invited based on winning the Minsky Medal. *International Joint Conference on Artificial Intelligence (IJCAI)*.

INVITED PAPERS TO APPEAR AND IN PROGRESS

1. Sandholm, T. What Can and Should Humans Contribute to Superhuman AI? *AI Magazine.* Invited article based on my Robert S. Engelmore Memorial Award. In progress.

2. Sandholm, T. Modern Organ Exchanges. Invited to *Communications of the ACM.*

PATENTS

1. Digital Media Campaign Management in Digital Media Delivery Systems. Tuomas Sandholm. US patent 11,743,536 issued 8/29/2023.

2. Medical Treatment Planning via Sequential Games. Tuomas Sandholm. US patent 11,610,680 issued 3/21/2023.

3. Automated Allocation of Media Campaign Assets to Time and Program in Digital Media Delivery Systems. Tuomas Sandholm, Fei Peng, and John Dickerson. US patent 11,589,135 issued 2/21/2023.

4. Edge Tests in Barter Exchanges. Tuomas Sandholm. US patent 11,373,111 issued 6/28/2022.

5. Digital Media Campaign Management in Digital Media Delivery Systems. Tuomas Sandholm. US patent 11,102,545 issued 8/24/2021.

6. Automated Allocation of Media Campaign Assets to Time and Program in Digital Media Delivery Systems. Tuomas Sandholm, Fei Peng, and John Dickerson. US patent 11,102,556 issued 8/24/2021.

7. Automated Allocation of Media Campaign Assets to Time and Program in Digital Media Delivery Systems. Tuomas Sandholm, Fei Peng, and John Dickerson. US patent 10,623,825 issued 4/14/2020.

8. Automated Allocation Of Media Campaign Assets To Time And Program In Digital Media Delivery Systems. Tuomas Sandholm, Fei Peng, and John Dickerson. US patent 10,097,904 issued 10/9/2018.

9. Automated Allocation Of Media Campaign Assets To Time And Program In Digital Media Delivery Systems. Tuomas Sandholm, Fei Peng, and John Dickerson. US patent 9,699,502 issued 7/4/2017.

10. System and Method for Contract Execution against Expressive Contracts. Tuomas Sandholm, David Parkes, Craig Boutilier, Subhash Suri, Jason Brown, Luc Mercier. US patent 8,732,047 issued 5/20/2014.

11. Automated Channel Abstraction for Advertising Auctions. Craig Boutilier, George Nemhauser, David Parkes, Tuomas Sandholm, Robert Shields, William Walsh. US patent 8,515,814, issued 8/20/2013.

12. System and Method for Payment Reconciliation Against Expressive Contracts. Craig Boutilier, David Parkes, Tuomas Sandholm, Subhash Suri, Jason Brown, Luc Mercier. US patent 8,494,935, issued 7/23/2013.

13. Items Ratio Based Price/Discount Adjustment in a Combinatorial Auction. Tuomas Sandholm, David Levine, David Parkes, Subhash Suri, Vincent Conitzer, Robert Shields, Yuri Smirnov. US patent 8,195,524, issued 06/05/2012.

14. Overconstraint Detection, Rule Relaxation and Demand Reduction in Combinatorial Exchange. Tuomas Sandholm, David Levine, David Parkes, Subhash Suri, Vincent Conitzer, Robert Shields, Yuri Smirnov. US patent 8,190,490, issued 05/29/2012.

15. Bid Modification Based on Logical Connections between Trigger Groups in a Combinatorial Exchange. Tuomas Sandholm, David Levine, David Parkes, Subhash Suri, Vincent Conitzer, Robert Shields, Yuri Smirnov. US patent 8,190,489, issued 05/29/2012.

16. Dynamic Exchange Method and Apparatus. Tuomas Sandholm, David Levine, Subhash Suri, Robert Shields, Christopher Cole, Richard James McKenzie Jr., David Parkes, Vincent Conitzer, Benjamin Schmaus. US patent 8,165,921, issued 4/24/2012.

17. Method of Determining an Exchange Allocation that Promotes Truthful Bidding and Improves the Obtainment of Auction Objectives. Vincent Conitzer and Tuomas Sandholm. US patent 8,060,433, allowed 11/1/2011.

18. Market clearability in combinatorial auctions and exchanges. Tuomas Sandholm and Subhash Suri. US patent 7,783,529, issued 8/24/2010.

19. Preference Elicitation in Combinatorial Auctions. Tuomas Sandholm and Wolfram Conen. US patent 7,742,971, issued 6/22/2010.

20. Branch on Bid Searching Method and Apparatus. Tuomas Sandholm and Subhash Suri. US patent 7,716,110, issued 5/11/2010.

21. Method for Optimal Winner Determination in Combinatorial Auctions. (Continuation-in-part of the first patent that issued.) Tuomas Sandholm and Subhash Suri. US patent 7,716,101, issued 5/11/2010.

22. Combinatorial Auction Branch on Bid Searching Method and Apparatus. Tuomas Sandholm, Subhash Suri, Andrew Gilpin, and David Levine. US patent 7,640,189, issued 12/29/2009.

23. Method and Apparatus for Forming Expressive Combinatorial Auctions and Exchanges. Tuomas Sandholm, Subhash Suri, David Levine, Andrew Gilpin, John Heitmann, and Robert Shields. US patent 7,610,236, issued 10/27/2009.

24. Method and Apparatus for Conducting a Dynamic Exchange. Tuomas Sandholm, David Levine, David Parkes, Subhash Suri, Vincent Conitzer, Robert Shields, and Yuri Smirnov. US patent 7,577,589, issued 8/18/2009.

25. Dynamic Exchange Method and Apparatus. Tuomas Sandholm, Richard James McKenzie Jr., David Levine, David Parkes, Subhash Suri, Vincent Conitzer, Robert Shields, Benjamin Schmaus, and Christopher Cole. US patent 7,499,880, issued 3/3/2009.

26. Method and apparatus for selecting a desirable allocation of bids in a combinatorial exchange setting. Craig Boutilier, Tuomas Sandholm, and Robert Shields. US Patent 7,353,191, issued 4/1/2008.

27. Method for Optimal Winner Determination in Combinatorial Auctions. Tuomas Sandholm and Subhash Suri. US Patent 7,305,363, issued 12/4/2007.

28. Japanese patent issued corresponding to the patent below.

29. Method, Apparatus, and Embodied Data Structures for Optimal Anytime Winner Determination in Combinatorial Auction-Type Problems. Tuomas Sandholm. US patent 6,272,473, issued 8/7/2001.

SIGNIFICANT SYSTEMS BUILT (numerous lesser software artifacts not listed)

- Four AI software products built at Strategy Robot, Inc. for game-theoretic analysis of four different classes of DoD problems (Course-of-Action (COA) generation and execution, portfolio planning and deployment, multi-base defense planning and execution, and missile defense and offense), 2018–.

- Eleven products built at Optimized Markets, Inc. for advertising campaign sales, allocation, scheduling, and pricing optimization, as well as prediction, 2012–.

- *Pluribus* is the first superhuman gaming AI milestone for any game with more than two players. It beat the best humans at six-player no-limit Texas hold'em poker [*Science*, 2019]. I developed it with my PhD student Noam Brown.

- *Libratus* is an AI for playing Heads-Up No-Limit Texas Hold'em. This ground-breaking AI system was the first to reach superhuman level in this game, as evidenced by beating a team of four top professional specialists in this game in the landmark *Brains vs. AI* event that I organized in January 2017 [*Science*, 2018]. It involved the humans playing 120,000 hands of poker against *Libratus* over 20 days. I developed *Libratus* with my PhD student Noam Brown.

- *Lengpudashi* is a version of *Libratus* that played a 36,000-hand exhibition against 6 Chinese poker professionals for a prize in April 2017, and beat them significantly.

- Software for finding provably optimal exchanges of kidneys in live paired donation networks. Only such software scalable to nation-wide level (10,000 donor-patient pairs) [EC-07]. Our software supports any cap on cycle length, altruistic donor chains, any cap on chain length, weights on matches, weights on altruistic donors, and weights on kidneys that are left over at the end of chains triggered by altruistic donors. Our software is the only software that can include long chains and optimize with more than 100 pairs.

  – Our software has been running the nationwide kidney exchange at UNOS (United Network for Organ Sharing), the government body that controls transplantation, since its inception in October 2010. Our software (and future versions thereof) was selected in Fall 2008 by UNOS from among all the providers of kidney exchange software. The kidney exchange now includes 80% of the transplant centers in the US, that is, around 180 transplant centers. Our software conducts a match run twice a week using our technology. Our software is installed at the UNOS headquarters in Richmond, and we provide updates to it as our technology becomes more general and more scalable. It makes the match decisions at UNOS without any manual intervention.

    We introduced the idea of never-ending altruist-triggered donation chains [*New England Journal of Medicine* 2009]. UNOS incorporated altruist-triggered donation chains into the exchange in April 2011, and has decided to move to using our never-ending ones. Most kidney exchange transplants nowadays (across all

kidney exchanges in the US) occur via never-ending altruistic donor chains, saving hundreds of lives per year in the US alone.

In addition, in November 2011, UNOS totally changed its policy regarding how chains are executed based on a simulation study we did in my laboratory. Because we have the only scalable winner determination algorithm for kidney exchange, we were in a unique position to be able to conduct those simulations.

- Our software was also used as the decision-making engine of the *Paired Donation Network*, one of the two largest regional kidney exchanges in the US at the time, 2009–2011 (until the network closed down in favor of larger ones).
- Our software was also used by the other of the two largest regional kidney exchanges in the US, the *Alliance for Paired Donation (APD)*, a kidney exchange network of 61 transplant centers across 15 states, 2006–2008. APD is now a member of our UNOS nationwide kidney exchange, although it still conducts local match runs also.

- A new matching framework, FUTUREMATCH, for example for kidney exchange, that automatically learns to match better using large-scale data, and automatically learns to instantiate human value judgments into a concrete optimization objective (with PhD student John Dickerson) [AAAI-15a]. The system does all this in the context of dynamic, failure-aware matching, and balances efficiency and fairness.

- The leading kidney exchange (and other organ) simulator (with PhD student John Dickerson). Open sourced on Github.

- A commercial optimization engine and cloud-based combinatorial market system for advertising campaign sales, proposal generation, inventory allocation, scheduling, and pricing (for TV, Internet display, streaming, mobile, game, and cross-media advertising). Applies to cable operators (MSOs), broadcast networks, cable networks, TV over Internet, cross-media advertising, etc. Version 2.0 of products completed (with PhD student John Dickerson, Dr. Fei Peng, and others). My talk on this was highlighted as a video on the NSF front page in 2013.

- A commercial optimization engine and system for deciding whether to sell cable advertising slots to zone- versus interconnect-level campaigns (with PhD student John Dickerson). Highly successful proof-of-concept on real data with one of the world's largest Multi-System Operators from 2013 onward.

- An optimal integer program solver that uses automated Dantzig-Wolfe decomposition and tree search (with PhD student Sidd Jain), 2011-2012.

- Commercial system for matching expressive advertising campaigns to inventory defined by attributes in Internet display advertising [AAAI-08]. To tame the combinatorial explosion in possible attribute vectors, it uses a new approach which we call *automated channel abstraction* [AAAI-10].

- Market design, and winner determination algorithm, for combinatorial bidding for university courses by students [AAMAS-10]. Our design and algorithm was fielded at Wharton (University of Pennsylvania business school) with the help of my graduated PhD student Abe Othman. Wharton started using it for their course allocation in Fall 2013. The problem with traditional business school (combinatorial) course bidding mechanisms is that they assume quasilinear utility: a student's utility is how much he values the courses he gets plus how much of his funny money he has left over. In reality, however, the left-over funny money has no value. Our approach tackles this issue—which has significant implications also on what the winner determination problem is—directly.

- Gates Hillman Prediction Market (live 8/2008-9/2009) [EC-10a]. Largest prediction market in history by then by event partition size. Hundreds of users and tens of thousands of trades.

- First liquidity-sensitive automated market makers [EC-10b].

- Program for finding a Nash equilibrium in games that uses qualitative information about the equilibrium as extra input to speed up the process [AAMAS-10].

- Some of the world's best programs for playing Heads-Up No-Limit Texas Hold'em poker: *Tartanian* (2007), *Tartanian2* (2008), *Tartanian3* (2009), *Tartanian4* (2010), *Tartanian4b* (2010), *Tartanian5* (2012), *Tartanian6* (2013), *Tartanian7* (2014), *Tartanian8* (2016).

- Claudico (2015) is a significantly better program than Tartanian7 for Heads-Up No-Limit Texas Hold'em. I organized the "Brains Vs. AI" event in April–May 2015 to pit Claudico against four of the top-10 human pros in the world in this game. This was the first man-machine match in no-limit poker. They played 80,000 hands. While the humans won, the match was so close that it was a statistical tie.

- Some of the world's best programs for playing Heads-Up Limit Texas Hold'em poker: *GS1* (2006), *GS2* (2007), *GS3* (2007), *GS4* (2008), *GS5* (2009), *GS5 dynamic* (2009), *GS6* (2010), *GS6 exploitative* (2010).

- Program for playing *6-person* Texas Hold'em poker: *CMURing* (2008).

- Techniques for solving huge sequential incomplete-information games (such as poker).
  - Numerous new abstraction algorithms [AAAI-06, AAMAS-07, AAAI-07, JACM-07, AAMAS-08, AAAI-08, EC-12, EC-14, AAAI-14a, AAAI-14b].
  - Leading practical game abstraction algorithm [AAAI-14a].
  - First scalable action abstraction algorithm that converges to optimal action sizes [AAAI-14b].
  - First game abstraction algorithms that give bounds on solution quality (regret in the original game) [EC-12, EC-14, arXiv-14].

  - Several highly parallel algorithms for equilibrium finding based on smoothed gradient descent ideas [Mathematics of Operations Research-10, AAMAS-10, Mathematical Programming-12, AAAI-14].
  - New sampling techniques for the counterfactual regret (CFR) equilibrium-finding algorithm.
  - Highly parallel (tested on 2048 cores), non-locking version of CFR, and the abstraction algorithm that creates appropriate abstractions for it.
  - Scalable algorithm for computing a new kind of equilibrium refinement in large sequential incomplete-information games.
  - Endgame solver for large sequential incomplete-information games [AAAI-13 workshop].
  - A reverse mapping for large sequential incomplete-information games [IJCAI-13]. Now adopted by most competitive computer no-limit Texas Hold'em poker teams.
  - New leading safe nested endgame solver for large sequential incomplete-information games [AAAI-17 workshop].

- Program for finding near-optimal jam/fold strategies in *3-player* No-Limit Texas Hold'em poker tournaments [AAMAS-08, IJCAI-09].

- Prof. Milind Tambe's research group at USC developed algorithms that are currently in use at LAX airport and other airports for security scheduling, and in use for scheduling air marshalls to flights. According to him, "I thought you might find it interesting that your [Conitzer and Sandholm] paper on Stackelberg games, which we build on for building algorithms for Bayesian Stackelberg games has led to this nice outcome".

- At CombineNet 2003–2008, we developed the methodology and algorithms for, and built a system for, *automated scenario navigation* (by the buying team) for strategic sourcing, and the associated user interfaces [AAAI-04]. The algorithms are now incorporated into *ClearBox*, described below.

- At CombineNet 2003–2006, we built a system for *automated mechanism design* and user interfaces for exploring the revelation-outcome mapping. These were used in consultative mode in two large-scale industrial sourcing events.

- *ClearBox* is an industry-independent clearing engine for markets with expressive bidding. I programmed the first generation of the algorithm in 1997–98, and headed the development crew of several high-caliber engineers at CombineNet, Inc. from then on until CombineNet's acquisition in June 2010. *ClearBox* parses the market description in our XML language *CEDL (Combinatorial Exchange Description Language)* and automatically translates it into a search problem formulation that produces the optimal allocation of contracts, and is solvable extremely quickly. *ClearBox* supports 1) expressive bidding in a variety of formats (such as package bidding and conditional discount bidding), 2) side constraints (we captured all of the hundreds of real-world constraints that customers wanted into eight general classes from an optimization modeling perspective), and 3) multi-attribute considerations (item attributes and bids attributes;

each bid taker can express how he/she wants to take these into account). The clearing problem is NP-complete and inapproximable. Real-world problems that were unsolvable by any prior technology in 2000 took us 48 hours to solve to optimum at the time, and can now be solved by *ClearBox v 2.0* in less than a minute. Our algorithm is around 10,000 times faster than the world's second fastest on large-scale real-world generalized combinatorial procurement auction winner determination. In addition to fast market clearing, *ClearBox* supports automated minimal relaxation of combinations of soft constraints so as to obtain feasibility. It can also automatically strike the optimal tradeoff between solution cost and the cost of relaxing side constraints. Again, these are hard optimization problems. ClearBox also automatically identifies which suppliers the bid taker (buyer) should negotiate with, and on what aspects of their offers. This entails identifying—via solving hard optimization problems—which changes in the offers would result in the most significant savings. ClearBox also provides advanced quotes in highly expressive markets where even the meaning of quotes is nonobvious.

In all, *ClearBox* represents over 80 person-years of development by June 2010. In addition to *ClearBox*, we have built auxiliary software products around it: bidding interfaces, bid taker (analytics) interfaces, a data cleaning tool, a tool for configuring procurement auctions with expressive competition, a software framework that encompasses all these components, and finally, a separate real-time (rather than round-based) bidding system with expressive competition. In 2002-2010, via over 800 large-scale generalized combinatorial auctions, Global 2000 companies procured over $60 billion using our system in our hosting service, with savings of over $6 billion compared to previous year's prices (this is during a time when the general market prices in the largest segment, transportation, in fact increased). The savings came from improved efficiency of the allocation rather than from squeezing the suppliers; the suppliers also saved and adamantly prefer our procurement method over traditional reverse auctions. Additional benefits included shortened award time (from months to days) and the ability to quantitatively understand and address the design tradeoffs in the supply chain (such as the tradeoffs between procurement cost in the event at hand and long-term strategic benefits) through what-if analysis of the impact of (combinations of) the bid taker's side constraints and preferences [*Interfaces* 2006, *AI Magazine* 2007, *Handbook of Market Design* (Oxford University Press) 2013].

- Our *feasibility obtainer* is an extension of ClearBox where the optimizer finds a minimum-cost relaxation of the constraints if the scenario is over-constrained. It is incorporated into *ClearBox*. It finds the provably optimal solution.

- Our *optimal constraint relaxer* is an extension of ClearBox that finds a solution that minimizes the sum of sourcing cost and constraint relaxation cost. It is incorporated into *ClearBox*. It finds the provably optimal solution.

- At CombineNet 2003–2006, we developed the methodology and algorithms for, and built a system for, what we call *optimization-based negotiation* for strategic sourcing. The idea is that in addition to the usual inputs to ClearBox, the buyer can state how

he expects that he could improve the suppliers' offers by negotiating with them, and then asks the optimizer how he should negotiate in light of all of the inputs so as to minimize his total sourcing cost, for example, "If I can improve 5 discount schedules by 2% each, which 5 should I negotiate?" The algorithms are now incorporated into *ClearBox*. The system finds the provably optimal solution.

- Natural gas procurement, transport, and storage optimization application. Built at CombineNet 2004-2006. This is the first application to do a holistic optimization of natural gas procurement, transport, and storage. Interesting aspects of this problem include: large scale (e.g., thousands of pipes, 62 time periods), a multitude of contract types, nonlinearity of pipe transmission, nonlinearity of storage wells, nonlinearity of compressor stations, and the fact that contracts and storage wells carry state across time periods. Our solving algorithm finds the optimal solution (i.e., minimal-cost solution that satisfies all physical and business constraints given demand projections and price projections), and is over 3,000 times faster than the first-generation version which used the leading general-purpose commercial mixed integer programming package, CPLEX, out of the box. It is the only product that handles the economic issues (what existing contracts to use to what extent, which contracts to cancel, what new contracts to strike, how to use the spot market; all of these optimized across hundreds of delivery points and 62 time periods) and logistical issues (62-period transport in pipe network, storage decisions about underground pools, compressor operations, etc.) in one holistic optimization.

- Wireless services optimization application. Built 2004-2006. Fielded. This application optimizes a company's assignment of employees to wireless service plans, given all (about 2,000) service plan offerings of different providers and the statistical usage patterns of the employees (from their previous month's wireless bills). It is the only product that handles bucketing plans, pooling plans, accessorial charges, switch-over costs, etc. It finds the provably optimal solution.

- Production planning optimization application. Built 2002-2003. Fielded at the Del Monte (formerly Heinz's) factory in Kansas.

- Poker-playing web site for playing Rhode Island Hold'em (built 2004—2005). Our bot on that site plays an exact game-theoretic equilibrium strategy, which we were able to find using our new algorithms for solving sequential games of incomplete information [*Journal of the ACM* 2007, EC-05], discussed in more detail in my research statement. Play at http://www.cs.cmu.edu/˜ gilpin/gsi.html.

- Web site that embodies our ideas of expressive charity donation [*Artificial Intelligence* 2011, EC-04].

- *eAuctionHouse* is a web-based next generation auction server prototype that my academic research group developed as part of the *eMediator* ecommerce server 1997-2000. It supports millions of auction types, and gives guidance to the user in choosing an appropriate one [*Computational Intelligence* 2002, AGENTS-00]. To our knowledge,

it was the first Internet auction that supports combinatorial auctions [*Artificial Intelligence* 2002a, IJCAI-99a, *Decision Support Systems* 2000, ICE-97], bidding via graphically drawn price-quantity graphs, and by mobile agents (these are automatically programmed to bid optimally on the user's behalf) [*IEEE Internet Computing* 2000]. The server began operation on the web in December 1998.

- *eCommitter* is a service that we built in 1998 for optimizing leveled commitment contracts. Leveled commitment contracts are a financial instrument that I invented, where each party can unilaterally decommit by paying a predetermined penalty. They can be used for a variety of applications as a tool for agents to efficiently accommodate future events [*Games and Economic Behavior* 2001, *AI Magazine* 2002, ICMAS-95, *Computational Intelligence* 2002]. One concern is that a rational self-interested agent is reluctant in decommitting because there is a chance that the other party will decommit, in which case the former agent gets freed from the contract, does not have to pay a penalty, and collects a penalty from the breacher. Given distributions of each contract party's best future outside offer, a contract price and decommitting penalties, the optimizer solves for each agent's rational decommitting threshold (how good its outside offer must be before it decommits) [IJCAI-99b]. Furthermore, the optimizer solves for the optimal contract itself (price and penalties). Leveled commitment contracts differ based on whether agents have to declare their decommitting decisions sequentially or simultaneously, and whether or not agents have to pay the penalties if both decommit. For a given contract, these protocols lead to different decommitting thresholds. However, we showed that each protocol leads to the same expected payoffs to the agents when the contract is optimized for each protocol separately [*Artificial Intelligence* 2002b]. The optimizer computes the optimal contracts and the rational decommitting thresholds for each of the protocols.

  Our leveled commitment contracts have already had impact. Mitsubishi has built an electronic market for recycling container space in Japan that uses our leveled commitment contracts, an academic research group has built a negotiation system in a manufacturing domain using them, another academic research group is using them in a digital library, and two research groups have recently started exploring leveled commitment contracts for bandwidth reservation.

- *eExchangeHouse* is a safe exchange planner that my group built in 1998-1999 [ICMAS-00]. It counters the threat that in unenforced environments, such as anonymous electronic commerce, the seller might not deliver the goods, or the buyer might not pay. My method achieves safety by splitting the exchange into chunks which the trade parties deliver in alternation [*IEEE Internet Computing* 1997]. The method is practical when such splitting incurs only little cost, as is the case with information goods and computation services. Using a game-theoretic analysis, the planner computes exchange strategies that guarantee that neither party is motivated to vanish before completing the exchange [PhD thesis 1996, IJCAI-95]. Only some ways of splitting the exchange into chunks and some sequences of delivering the chunks are safe in this sense. My algorithms for chunking and chunk sequencing provably find a safe exchange plan if one exists. The algorithms—as well as the amount of input that is solicited from

the users—vary based on whether the exchanged items and units of each item are independent or dependent in terms of their value to the exchange parties.

- *TRACONET* (TRAnsportation COoperation NET). I built this systems for distributed asynchronous negotiation among self-interested agents as my M.S. thesis for the Helsinki University of Technology while working at the Technical Research Centre of Finland. Built in 1990-91, it was the first distributed negotiation system for self-interested agents. I solved several questions related to asynchronous negotiation, and to avoiding local optima in the negotiation [International Conference on Artificial Intelligence Applications in Transportation Engineering 2002, AAAI-03, ICMAS-05, PhD thesis 1996, AAAI Spring Symposium 1998, AAAI-99, ICDCS-00, *Autonomous Agents and Multi-Agent Systems* 2000]. Tested with large-scale data from five independent delivery companies, the negotiation led to a 17% savings in transportation costs. With over 500 citations, my AAAI-93 paper is the most cited paper from that conference.

- *DIS-DSS* is a system for automated negotiation about ground resource planning and scheduling among airlines. I developed this system with two others during my first year of graduate school in 1992-93. The system used texture measures to guide each agent's local search. High-level texture measure information was also shared between the agents, which made joint problem solving more efficient [AAAI-04].

- *EPO* is a truck routing and scheduling application that I developed with six others in 1991-92 [Finnish Artificial Intelligence Conference 1992], for a forestry company that is now Europe's largest. I designed and implemented the module that allocates weekly transportation tasks among days. I also developed half of the module that allocates distributed wood batches among factories based on multiple criteria. The system was chosen one of the year's 17 most innovative AI applications internationally at the 1995 Conference on Innovative Applications of AI. It has been fielded and its use has paid back its development costs. Next I built a train routing and scheduling application for the same company. Both the truck and train transportation problems were combinatorial and the instances very large. They were characterized by numerous hard to encode constraints from domain experts. The algorithms used both constructive search and iterative refinement.

- At the Nokia Research Center in 1990, I participated in the development of a rule-based pension law expert system using the commercial XIPlus shell, and in the development and testing of a compiler for transforming XIPlus rules into C-code. The expert system was adopted into daily use at an insurance company.

- Invented aerial kicking for robot soccer and came up with the design for the first robotic chip kicker (around 2001). This was then actually built by Prof. Manuela Veloso's research group.

EVIDENCE OF EXTERNAL REPUTATION

CITATIONS AND AWARDS

Academic awards

- *Fellow*, International Academy of Artificial Intelligence Sciences (AAIS), 2026.
- Alfred Kordelin Prize, 2025. The Euro 50,000 Alfred Kordelin Prize is one of the most significant annual awards presented in Finland. The prizes are awarded for socially impactful and topical contributions to science, the arts, and public education.
- AAAI Award for AI for the Benefit of Humanity, 2023. "For outstanding scientific and software contributions to the design and implementation of organ exchanges, and their direct impact on both practice and policy". The AAAI Award for Artificial Intelligence for the Benefit of Humanity recognizes positive impacts of artificial intelligence to protect, enhance, and improve human life in meaningful ways with long-lived effects. It is one of the most prestigious awards that AAAI (the Association for the Advancement of Artificial Intelligence) has.
- Vannevar Bush Faculty Fellowship (VBFF), 2023. This is the largest single-PI award that the DoD offers. Ten given per year across all science and engineering.
- IJCAI John McCarthy Award, 2021. "For his significant research contributions to multiagent systems, computational economics, optimization and game playing, and their application in real-world settings". The IJCAI John McCarthy Award is intended to recognize established mid-career researchers, typically between fifteen to twenty-five years after obtaining their PhD, that have built up a major track record of research excellence in artificial intelligence. Nominees of the award will have made significant contributions to the research agenda in their area and will have a first-rate profile of influential research results. One award per year is given.
- AAAI Robert S. Engelmore Award, 2021. "For outstanding research contributions in Artificial Intelligence, its application to electronic market places, the highly original use of AI in strategic multi-player games, and the application of AI to optimize organ exchanges". "The award is given to people who have demonstrated excellence in scholarship in AI, outstanding applications of AI, as well as extraordinary service to AAAI and the AI community."
- University Professor, 5/2020. The title of University Professor is the highest designation a faculty member can receive at Carnegie Mellon. "The number of University Professors should be no more than about 10 percent of number of faculty at Carnegie Mellon University holding the rank of Professor."
- *Science* selected our work on superhuman multi-player poker as *Science Breakthrough of the Year Runner-Up*, 2019, with my student Noam Brown.

- IJCAI Marvin Minsky Medal, 2019. Given for our AI Libratus, the first and only AI to beat top professionals in two-player no-limit Texas holdem. (Second time ever this medal has been given.)
- *Alumnus of the Year*, Aalto University School of Science, 2019.
- Angel Jordan Professor of Computer Science, 2/2018. Endowed chair.
- Allen Newell Award for Research Excellence, Carnegie Mellon University, 2018. For our "work in advancing artificial intelligence in hidden-information adversarial settings and demonstrating this via Libratus", with my student Noam Brown.
- Annual Supercomputing Award for "Best use of AI", *Supercomputing Conference (SC)*, 2018, with my student Noam Brown.
- La Recherche (a French science monthly very similar to Scientific American) selected *Libratus* as one of the scientific breakthroughs of 2017, with my student Noam Brown.
- *Science* selected our work (together with University of Alberta's) on "AI Mastering Poker" as one of the 12 runner-ups for Scientific Breakthrough of the Year 2017, with my student Noam Brown.
- Annual Supercomputing Award for "Best use of AI", *Supercomputing Conference (SC)*, November 2017. This was for *Libratus*, our AI that became the first AI to beat the best humans at no-limit poker. Specifically: "By beating four of the worlds best human players at heads-up, no-limit Texas hold'em poker, Libratus set a new benchmark for artificial intelligence in a game that involves incomplete information and deception.", with my student Noam Brown.
- A similar form of poker as we used in the Brains vs. AI competition that I organized in January 2017 was selected in Fall 2017 into observer status as an Olympic sport. That announcement discussed our Brains vs. AI event specifically.
- Our work on "Computer Beats Poker Pros in Brains vs. AI" was selected as one of the *Top 10 Stories of 2017*, Pokernews, with my student Noam Brown.
- *Libratus* beating top human professionals was selected #3 in the list of Top Pittsburgh Tech Stories for 2017, by Tribune Review, with my student Noam Brown.
- *Honorary Doctorate*, University of Zürich, 2016. They also organized a symposium the day before: "Electronic Markets Design: A Symposium in Honor of Tuomas Sandholm".
- *Computers and Thought Award*, 2003. This award is given biannually by the International Joint Conferences on Artificial Intelligence to the leading researcher in artificial intelligence under the age of 35.

- *Inaugural ACM SIGART Autonomous Agents Research Award*, 2001.

  Quote from the award description:

  "ACM SIGART, in collaboration with the International Conference on Autonomous Agents, has instituted an annual award for excellence in research in the area of autonomous agents. The award is intended to recognize researchers whose current work is an important influence on the field. The award is an official ACM award, funded by an endowment created by ACM SIGART from the proceeds of previous Autonomous Agents conferences.

  The winner of the 2001 award is Tuomas Sandholm, of Carnegie Mellon University. Dr. Sandholm has conducted an intensive research program in electronic markets and multi-agent systems, and has also done work in other areas of autonomous agents. The breadth and depth of his contributions over a relatively short period of time are impressive. In addition, he has been an active contributor to the Autonomous Agents community, contributing regularly to the AA conference since its inception.

  In recognition of the award, Dr. Sandholm will present an invited lecture at the 2001 International Conference on Autonomous Agents. The title of his presentation is "Agents in Combinatorial Markets."

- *Fellow*, American Association for the Advancement of Science (AAAS), 2021. Citation: "For distinguished contributions at the intersection of artificial intelligence, economics and operations research, especially in the context of organ exchanges and imperfect information games.".

- *Fellow*, Institute for Operations Research and the Management Sciences (INFORMS), 2014. Citation: "For contributions to research in computational economics, including market design, combinatorial auctions, and game theory, and for contributions to practice through companies that create new markets using optimization methods.".

- *Fellow*, Association for Computing Machinery (ACM), 2008. Citation: "For contributions to combinatorial auctions and mechanism design.".

- *Fellow*, Association for the Advancement of Artificial Intelligence (AAAI), 2008. Citation: "For significant contributions to the foundations of multiagent systems and computational game theory, pioneering work in combinatorial auctions, multiagent preference elicitation, and automated mechanism design, and principles and large-scale application of electronic marketplaces.".

- My kidney exchange work was selected as one of "the 18 most impressive AI things they have ever seen" by AI experts, Business Insider 11/30/2015.

- *HPCWire Supercomputing Awards: Readers' Choice - Best Data-Intensive Application/Use*, 2014. For the work that I did with my PhD student John Dickerson and the Pittsburgh Supercomputing Center (PSC): Kidney exchange modeling on PSC's Blacklight. We tied for the win with IBM's Watson.
  `www.hpcwire.com/2014-hpcwire-readers-choice-awards/16/`

- Selected one of the *three most influential academics in the business world* by The Brilliant Issue: 73 Biggest Brains in Business, *Condé Nast Portfolio* Magazine, May 2008.
- Aminer Most Influential Scholar Award, 2019.
- *Alfred P. Sloan Foundation Fellowship*, 2003-2005.
- *NSF CAREER award*, US$ 456,098, 1997-2002.
- Award for *Outstanding Achievement in Research*. Computer Science Department, University of Massachusetts Amherst, Outstanding Achievement and Advocacy Awards, 2009. (These were the inaugural awards of the department's alumni awards program.) Award citation:

  > "For path-breaking research in electronic commerce, AI, game theory, involving combinatorial auctions, mechanism design, negotiation, and game-solving techniques."

- *Edelman Laureate*, 2005. (The Franz Edelman award is the leading award in applied operations research; awarded by INFORMS. Our team was one of six finalists. Finalists become Edelman Laureates.)
- #1 most cited person in artificial intelligence over the last 10 years. Ranking according to Microsoft 4/2/2010: http://academic.research.microsoft.com/CSDirectory/author_category_5_last10.htm
- Our program Claudico is one of the top eight finalists for the PokerListings *Rising Star Award*, 2015. The other finalists are human.
- *International Fellow*, "Engineering Social and Economic Institutions" (ESEI) Center at the University of Zürich, Switzerland, 3/2013–2015 (i.e., when the center finished).
- Annual Computer Poker Competition (hosted at the AAAI Conference on Artificial Intelligence (AAAI)) successes:
  - We won the 2016 Competition, Heads-Up No-Limit Texas Hold'em, in both categories (total bankroll and elimination). We beat each opponent with statistical significance. (There was no competition in 2015.)
  - We won the 2014 Competition, Heads-Up No-Limit Texas Hold'em, in both categories (total bankroll and elimination). We beat each opponent with statistical significance.
  - We came third in the 2013 Competition, Heads-Up No-Limit Texas Hold'em bankroll instant run-off category.
  - We came third in the 2013 Competition, Heads-Up No-Limit Texas Hold'em total bankroll category (statistical tie for second).

  - We came second in the 2012 Competition, Heads-Up No-Limit Texas Hold'em bankroll instant run-off category.
  - We came third in the 2012 Competition, Heads-Up No-Limit Texas Hold'em total bankroll category.
  - We won the 2010 Competition, Heads-Up No-Limit Texas Hold'em total bankroll category.
  - We came third in the 2010 Competition, Heads-Up No-Limit Texas Hold'em bankroll instant run-off category.
  - We won the 2008 Competition, Heads-Up Limit Texas Hold'em total bankroll category. (We also obtained the highest bankroll in the Heads-Up No-Limit Texas Hold'em competition.)

- The "Brains vs AI" poker event that I organized, and our bot *Claudico*, were selected into the "TOP POKER STORIES OF 2015" by High Stakes Database.

- *AAAI Deployed Application Award* (for my work on expressive commerce for strategic sourcing), awarded at the Conference on Innovative Applications of Artificial Intelligence (IAAI), Boston, July, 2006.

- My project was selected as one of the *ATP Gems and Success Stories* by the Advanced Technology Program (ATP) of the National Institute of Standards and Technology (NIST). Title of the release by NIST: "Advanced Optimization Technology to Enhance Business Decision Making", 2005 (updated 2006).

- *People Magazine*, *2009 Heroes Among Us Award* was given to a kidney donor chain planned by our algorithm.

- *ACM Distinguished Dissertation Award nomination*, University of Massachusetts, Amherst, 7/1997.

- *Graduate Fellow*, University of Massachusetts, (awarded annually to one of 160 graduate students), 1994-95.

- *ACM Recognition of Service Award* from the Association for Computing Machinery, 2003. For serving as Program Co-Chair of AAMAS-03.

- Conference on Innovative Applications of Artificial Intelligence (IAAI): EPO transportation optimization system chosen one of the year's 17 most innovative AI applications internationally, 1995.

- *Finnish Science Academy Scholarship*, 1993.

- *Information Technology Research Foundation Scholarship*, 1993.

- *Finnish Culture Foundation Rank Xerox Fund Scholarship*, 1995.

- *Finnish Culture Foundation Scholarship*, 1991.

- *Transportation Economic Society Scholarship*, 1992.
- *Exchange Researcher Scholarship*, Technical Research Centre of Finland, 1992.
- *Heikki and Hilma Honkanen Foundation Medal and Scholarship*, 1994.
- *Charles Baudoin Scholarship*, Thanks to Scandinavia Foundation, 1991.
- *Leo and Regina Wainstein Foundation Scholarship*, 1994.
- *Jenny and Antti Wihuri Foundation Scholarship*, 1993.
- *Ella and George Ehrnrooth Foundation Scholarship*, 1994.
- *President of the Helsinki University of Technology Award* for quick earning of M.S. (3 years and 4 months, B.S. included—average is 6 years), 1991.
- *Who's Who in the World* (by Marquis, US), 1999.
- *AcademicKeys Who's Who in Sciences Higher Education*, 2006.
- *Who's Who in Science and Engineering* (by Marquis, US), 4th edition and 5th edition.
- *Masterminds of Artificial Intelligence* on flickr.com, 2009.
- My PhD student Vincent Conitzer went on to win the *ACM/SIGAI Autonomous Agents Research Award* (2021), *IJCAI Computers and Thought* award (2011), was selected by IEEE Intelligent Systems as one of the *AI's top 10 to Watch* (2011), and won (along with Tim Roughgarden) the *2014 Social Choice and Welfare prize* as the first computer scientists to ever win that award.
- My PhD student Noam Brown won the 2018 Open Philanthropy AI Fellowship and the Tencent AI Lab Fellowship, and the Open Philanthropy AI Fellowship, and was selected to the MIT Technology Review Innovators Under 35 (2019).
- My postdoc Pingzhong Tang was selected into the MIT Technology Review Innovators under 35 (Artificial intelligence and robotics), 2018.
- My PhD student Gabriele Farina won a Facebook Fellowship (2019-21).
- My PhD student John Dickerson won a Siebel Fellowship (2015–16), Facebook Fellowship (2015–16), and an NDSEG Fellowship (2012–15). In 2020, he was selected to IEEE Intelligent Systems "AIs Ten to Watch".
- My PhD student Christian Kroer won a Facebook Fellowship (2016–17).
- My PhD student Abe Othman won the Google Fellowship in Market Algorithms, 2011 (at most one awarded per year in the world).
- My PhD student Abe Othman was a Facebook Fellowship finalist, 2010, and then was selected to the Forbes 30 under 30.

- My PhD student Noam Brown got an honorable mention in the NSF graduate fellowship program, 2014.
- My PhD student (co-advised with Nina Balcan) Ellen Vitercik won the NSF Graduate Research Fellowship, 2016–2019.
- My PhD student (co-advised with Nina Balcan) Ellen Vitercik won the Microsoft Research Women's Fellowship, 2016.

Industrial and industry-academic awards

- *100 Most Intriguing Entrepreneurs*, award from Goldman Sachs, 2020.
- *Carnegie Science Center Award for Excellence:* Sandholm won the Information Technology category (which is one of seven categories), 2004.
- *Ernst & Young Entrepreneur of the Year Award* finalist, Western PA, 2003.
- Selected to be one of the *Pros to Know* by Supply & Demand Chain Executive Magazine. Writeup February/March, 2004.
- *2004 Fast 50* nominee, Disrupters: Scientists and engineers whose breakthrough advances have created new ways to live and work. Fast Company Magazine's 3rd annual competition. Topic: "Using Artificial Intelligence to Make E-Commerce More Effective."
- CombineNet won the Information Technology category in *Tech 50*, 2005. (This annual competition is among 50 finalists among southwestern Pennsylvania's technology companies in six categories.)
- CombineNet selected Top 100 Logistics IT Provider for 2010 by *Inbound Logistics Magazine*, 6/2/2010.
- For the fifth time, *Supply & Demand Chain Executive* magazine recognized CombineNet as one of the *Supply & Demand Chain Executive 100*. The competition's focus this year was "Supply Chain: Back to Basics and Beyond - In Search of the Roots of Supply Chain Excellence", May, 2010.
- *Supply & Demand Chain Executive* magazine recognized CombineNet as one of the 2009 *Supply & Demand Chain Executive 100*, "Supply Chain Saves the Enterprise", Spring 2009.
- CombineNet received the 2010 *Best of Pittsburgh Award* by the U.S. Commerce Association (USCA).
- CombineNet named 2009 Top 100 Technology Solution Company by *Food Logistics*, December 2009.

- CombineNet received the 2009 *Best of Pittsburgh Award* by the U.S. Commerce Association (USCA). ("Each year, the USCA identifies companies that they believe have achieved exceptional marketing success in their local community and business category. These are local companies that enhance the positive image of small business through service to their customers and community.")
- US Postal Service received the Institute for Supply Management *R. Gene Richter Award for Leadership and Innovation in Supply Management* using CombineNet's technology, April 2009.
- CombineNet recognized as *'2008 Top 100 Logistics IT Company'* by *Inbound Logistics*, April 2008.
- CombineNet was named one of the top 100 supply and demand chain solution providers by *Supply & Demand Chain Executive*, 2004, 2008.
- HJ Heinz corporation won the CIPS Supply Management Award "Best use of technology" using CombineNet's technology, 11/18/2004.
- CombineNet was selected to be a finalist in *Procter & Gamble's R & D Innovation Award competition*, 2004. (Came second in the end.)
- CombineNet was selected to be a finalist for the *Codie Award*, software award in the Business Process Automation Category, 2004.
- CombineNet was selected to be in the *Tech 50* (*i.e.*, one of the regions leading 50 technology companies) by the Pittsburgh Regional Alliance in 2003.
- HJ Heinz Corporation's UK Truckload project with CombineNet was chosen 2nd (from over 150 nominees) for the CNET Networks UK Technology Awards, *Business Technology Innovation of the Year* category, 2003. (Sponsored by IBM.)
- Team BotSpot selected BusinessBots to be the BotSpot of the Week, June 8, 1998.

Best paper awards & other recognition of specific papers

1. *ACM SIGEcom Test of Time Award 2026* for our paper "Automated Online Mechanism Design and Prophet Inequalities (AAAI-07)" (by Hajiaghayi, Kleinberg, and Sandholm) together with the paper "Adaptive limited-supply online auctions (EC-04)" (by Kleinberg, Hajiaghayi, and Parkes). "The SIGEcom Test of Time Award recognizes the author or authors of an influential paper or series of papers published between ten and twenty-five years ago that has significantly impacted research or applications exemplifying the interplay of economics and computation."

   The citation in this case reads: "...for their pioneering contributions connecting optimal stopping theory — most notably prophet inequalities — to the design of online auction

and pricing mechanisms under uncertainty. Together, these papers forged a vital bridge across the EC, AI, and theoretical computer science communities. By elegantly uniting mathematics with economic theory, they established a foundation that has profoundly shaped algorithmic economics over the past two decades."

2. Our paper "Parallelizing Counterfactual Regret Minimization" was featured on daily-papers.io, 5/15/2026.

3. My PhD student Brian Zhang's PhD dissertation:

   - Won the *AAAI/ACM SIGAI Doctoral Dissertation Award Honorable Mention*, 2025.
   - Won the *CMU School of Computer Science ACM Dissertation Award Nomination*, 2025.
   - Won the *CMU School of Computer Science Distinguished Dissertation Award Honorable Mention*, 2025.

4. Our paper "Computing Game Symmetries and Equilibria That Respect Them" won a Best Poster Award at the AAAI Conference on Artificial Intelligence (AAAI), 2025.

5. Our paper "How Much Data Is Sufficient to Learn High-Performing Algorithms?" was selected by *Journal of the ACM (JACM)* as a 2024 Featured Article.

6. My PhD student Gabriele Farina's dissertation:

   - Won the *AAAI/ACM SIGAI Doctoral Dissertation Award*, 2023.
   - Won the *ACM SIGecom Doctoral Dissertation Award*, 2024.
   - Won the *ACM Doctoral Dissertation Award Honorable Mention*, 2024.
   - Won the *CMU School of Computer Science Distinguished Dissertation Award*, 2023.
   - Won Runner Up for the 2023 Victor Lesser Dissertation Award, given by the International Foundation on Autonomous Agents and Multiagent Systems (IFAAMAS), 2023.

7. Our paper "New Sequence-Independent Lifting Techniques for Cutting Planes and When They Induce Facets" won honorable mention in the student poster competition at the *Mixed Integer Programming Workshop (MIP)*, 2024.

8. My PhD student Ellen Vitercik's (co-advised with Nina Balcan) dissertation won the 2022 SIGecom Dissertation Award.

9. *Influential Paper Award*, International Foundation for Autonomous Agents and Multi-Agent Systems (IFAAMAS), 2022. With my then-student, now-colleague Vincent Conitzer. For the paper "Computing the optimal strategy to commit to" in Proceedings of the 7th ACM Conference on Electronic Commerce (EC), pp 82–90, 2006.

Citation: "This paper established the algorithmic foundations for the field of Stackelberg security games, including its more recent Green Security Games incarnation. The paper asks a fundamental question: what is the computational complexity of the problem of commitment to either a pure or a mixed strategy in a Stackelberg game, considering both complete and incomplete information? It set the basis for computing optimal leader strategies in security games which have led to much impactful work with real-world applications and has helped establish a strong mechanism design community within AAMAS, and beyond.".

10. My PhD student Ellen Vitercik's (co-advised with Nina Balcan) dissertation received a 2021 Victor Lesser Dissertation Award Runner Up / honorable mention.

11. My PhD student Ellen Vitercik's (co-advised with Nina Balcan) dissertation won the *CMU School of Computer Science Distinguished Dissertation Award*, 2021.

12. My PhD student Noam Brown's dissertation won the *2020 AAAI/ACM SIGAI Dissertation Award*.

13. My PhD student Noam Brown's dissertation won the *International Foundation for Autonomous Agents and Multiagent Systems (IFAAMAS) Victor Lesser Distinguished Dissertation award*, 2021.

14. My PhD student Noam Brown's dissertation won the *CMU School of Computer Science Distinguished Dissertation Award*, 2020.

15. Our paper "Superhuman AI for Multiplayer Poker" was selected to be presented in the special plenary session on *Highlights Beyond EC*, at the *ACM Conference on Economics and Computation (EC)*, 2020.

16. Our paper "Solving Imperfect-Information Games with Discounted Counterfactual Regret Minimization" was selected for an *Outstanding Paper Honorable Mention* at the *Association for the Advancement of Artificial Intelligence Annual Conference (AAAI)*, 2019. (1 of 4 papers receiving recognition out of 1,150 accepted papers and 7,095 submissions.)

17. Our paper "Estimating approximate incentive compatibility" won the "Exemplary Artificial Intelligence Track Paper Award" at the *ACM Conference on Economics and Computation (EC)*, 2019. Also won the Best Presentation by a Student or Postdoctoral Researcher Award. Also, invited to the *ACM Transactions on Economics and Computation (TEAC)* Special Issue on Best of EC-19.

18. Our paper "Safe and Nested Subgame Solving for Imperfect-Information Games" was selected to be one of the three papers for at the inaugural annual *AGT Fest*, 2018. These are top Algorithmic Game Theory papers from other conferences and journals that get presented in a special plenary session at the *ACM Conference on Economics and Computation (EC)*.

19. Our paper "Safe and Nested Subgame Solving for Imperfect-Information Games" won a *Best Paper Award* at the *Neural Information Processing Systems: Natural and Synthetic (NIPS)* conference, 2017. It was one of three best paper awards, out of 678 accepted papers and 3,240 submissions.

20. Our paper "Faster algorithms for extensive-form game solving via improved smoothing functions" won runner-up status in INFORMS Computing Society's *2017 INFORMS Student Paper Competition.*

21. Our paper "Small Representations of Big Kidney Exchange Graphs" from *EXPLORE-2016: The 3rd Workshop on Exploring Beyond the Worst Case in Computational Social Choice* was selected as the *Most Visionary Paper.*

22. My undergraduate advisee Ben Plaut's thesis "Algorithms for Social Good: Kidney Exchange" won the *2016 Allen Newell Award for Excellence in Undergraduate Research.*

23. Our paper "Price of Fairness in Kidney Exchange" from the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)* 2014 was selected as one of the top 10% papers of the conference. It was subsequently invited to be submitted as a fast-track submission to the "Best of AAMAS-14" special issues of *Artificial Intelligence (AIJ)* and of *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS).*

24. Our poster "Toward Multi-Organ Exchange" was selected as a *Poster of Distinction* at the *World Transplant Congress (WTC)*, San Francisco, CA, July 26–31, 2014.

25. Our paper "Throwing darts: Random sampling helps tree search when the number of short certificates is moderate" from the *Symposium on Combinatorial Search (SoCS)* 2013 was invited to be submitted to the "Best of SoCS-13" Special Issue of the journal *AI Communications.*

26. My paper "An Algorithm for Optimal Winner Determination in Combinatorial Auctions" is the most-cited paper of the *International Joint Conference on Artificial Intelligence (IJCAI)*, 1999 (according to arnetminer, 7/19/2014).

27. Our paper "Safe Opponent Exploitation" from the ACM Conference on Electronic Commerce (EC) 2012 was invited to the "Best of EC-12" Special Issue of the journal *ACM Transactions on Economics and Computation (TEAC).*

28. Our paper "TRUSTS: Scheduling Randomized Patrols for Fare Inspection in Transit Systems" from the *Innovative Applications of Artificial Intelligence (IAAI)* conference 2012 was invited by the conference chair to the *AI Magazine* special issue on the best papers from that conference.

29. Our paper "New Complexity Results about Nash Equilibria" was highlighted on the web site of the journal *Games and Economic Behavior* as one of the most highly cited papers in that journal.

30. My PhD student Andrew Gilpin's dissertation won the *International Foundation for Autonomous Agents and Multiagent Systems (IFAAMAS) Victor Lesser Distinguished Dissertation award*, 2009.

31. Our paper "Advantages of a Leveled Commitment Contracting Protocol" (AAAI-96) was one of five finalists for the International Foundation for Autonomous Agents and Multi-Agent Systems 2008 Influential Paper Award. (The award recognizes "publications that have made seminal contributions to the field", evaluated with a minimum of 10 years of hindsight.)

32. Our paper "Computing an Approximate Jam/Fold Equilibrium for 3-Agent No-Limit Texas Hold'em Tournaments" was one of six finalists for Best Student Paper Award at the *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, 2008.

33. Our paper "Better automated abstraction techniques for imperfect information games, with application to Texas Hold'em poker" was Best Paper Award Runner-Up at the *International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, 2007.

34. My paper "Expressive Commerce and Its Application to Sourcing" from the *Innovative Applications of Artificial Intelligence (IAAI) conference* 2006 was invited by the conference chair to the *AI Magazine* special issue on the best papers from that conference.

35. Our paper "A Technique for Reducing Normal Form Games to Compute a Nash Equilibrium" was selected as a runner-up for the Best Student Paper award of the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Hakodate, Japan, May, 2006.

36. My PhD student Vincent Conitzer's dissertation won the *inaugural International Foundation for Autonomous Agents and Multiagent Systems (IFAAMAS) Victor Lesser Distinguished Dissertation award*, 2006.

37. My PhD student Vincent Conitzer's dissertation won one of the three honorable mentions in the *ACM Distinguished Dissertation Award* competition, 2007.

38. Our paper "A New Solution Concept for Coalitional Games in Open Anonymous Environments" won a Best Paper Award at the *19th Annual Conference of the Japan Society on Artificial Intelligence (JSAI)*, 2005.

39. Our paper "Preference Elicitation and Query Learning" from the *Annual Conference on Learning Theory (COLT-03)*, was invited as a submission of select papers from that conference to the *Journal of Machine Learning Research (JMLR)*.

40. Our paper "Market Clearability" from the *International Joint Conference on Artificial Intelligence (IJCAI-01)*, was nominated as a fast-tracked submission to *Artificial Intelligence* based on strong reviews.

41. Our paper "Improved Algorithms for Optimal Winner Determination in Combinatorial Auctions and Generalizations" from the *National Conference on Artificial Intelligence (AAAI-00)*, was invited as a fast-tracked submission to *Artificial Intelligence* by the Editor-in-Chief and the Associate Editor.

42. Our paper "Surplus Equivalence of Leveled Commitment Contracts" from the *International Conference on Multi-Agent Systems (ICMAS-00)* was invited as a submission to the *Best of ICMAS-00* special issue of *Artificial Intelligence*.

43. Our paper "Optimal Flow Aggregation" from the *Scandinavian Workshop on Algorithm Theory (SWAT-00)* was invited to the Nordic Journal of Computing, special issue of top-ranked papers from SWAT-00 (we declined).

44. My paper "eMediator: A Next Generation Electronic Commerce Server" from the *International Conference on Autonomous Agents (AGENTS-00)* was invited to the "Agent-Mediated Electronic Commerce" special issue of best papers at the conference, Springer-Verlag's LNAI series (I declined).

45. Our paper "Anytime Coalition Structure generation: An Average Case Study" from the *International Conference on Autonomous Agents (AGENTS-99)* was invited to the *Best of AGENTS-99* special issue of the journal *Autonomous Agents and Multi-Agent Systems* (we declined).

46. My paper "Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation." from the *International Conference on Multi-Agent Systems (ICMAS-98*) was invited as a submission to the *Best of ICMAS-98* special issue of the journal *Autonomous Agents and Multi-Agent Systems*.

Exceptional national awards in high school

- *Pro Scientia Medal.*
  Awarded by the National Association for Teachers of Mathematical Studies, 1987.

- *National writing competition award.*
  Awarded by the League of Finnish-American Societies, 1987.

- *Chemistry Olympics trainee.*
  National special program for high-schoolers, 1986.

INVITED TALKS

Invited plenary talks at academic conferences (not including talks given on our work by students, postdocs, and other collaborators)

1. AI Algorithms for Healthcare Decision-Making and Organ Matching. Opening keynote. 3rd Transplant AI Conference at the University Health Network in Toronto in conjunction with Mayo Clinic. Toronto, Canada, 11/17/2025.

2. Superhuman Strategic Reasoning: Newest Academic Breakthroughs and the Leading AIs for Defense Applications from the Best AI Fighter Pilots to Command and Control to Missile Defense to Nuclear Deterrence. Opening keynote. *Nxt AI* conference, San Francisco, CA, November 3–5, 2025.

3. General search techniques without common knowledge for imperfect-information games, and application to superhuman Fog of War chess. Keynote. *Theoretical Aspects of Rationality and Knowledge (TARK)* conference. Dusseldorf, Germany. July 14–16, 2025.

4. General search techniques without common knowledge for imperfect-information games, and application to superhuman Fog of War chess. *Midwest ML Symposium (MMLS25)*. Chicago, IL. June 23–24, 2025.

5. The State of Representing and Solving Games. Plenary talk at the *AMMCS International Conference*, Waterloo, Canada, August 14–18, 2023. AMMCS stands for Applied Mathematics, Modeling and Computational Science.

6. Modern Organ Exchanges: Market Designs, Algorithms, and Opportunities. Plenary talk for the *AAAI Award for AI for the Benefit of Humanity*, AAAI (the Association for the Advancement of Artificial Intelligence) Annual Conference (AAAI), Washington, D.C., 2/9/2023.

7. The State of Representing and Solving Games. *Nobel Symposium* "100 Years of Game Theory", Stockholm, Sweden, December 17–19, 2021.

8. Sample Complexity of (Automated) Mechanism Design. Keynote talk. Third Annual Responsible Machine Learning Virtual Summit: "AI and Social Good", organized by UC Santa Barbara's Center for Responsible Machine Learning (CRML), the College of Engineering, and the Department of Computer Science, 10/1/2021.

9. Developing and Using Superhuman AIs: What Can Humans Contribute? IJCAI John McCarthy Award talk, at the *International Joint Conference on Artificial Intelligence (IJCAI)*, 2021.

10. Configuring algorithms automatically: From practice to theory. Keynote talk. IJCAI-WAIC Explorer Panel, World AI Conference (WAIC), 7/9/2021. IJCAI is the International Joint Conference on Artificial Intelligence.

11. Sample Complexity of Mechanism Design. Opening keynote talk at the *Decentralization Conference*, 4/15/2021.

12. What Can and Should Humans Contribute to Superhuman AI? Robert S. Engelmore Memorial Lecture Award. *AAAI (Association for the Advancement of Artificial Intelligence) annual conference* and *Innovative Applications of Artificial Intelligence (IAAI)* conference, 2/4/2021.

13. Superhuman AI for Multiplayer Poker. *Conference on Web and Internet Economics (WINE)*, Columbia University, NYC, NY, 12/11/2019.

14. Steering Biological Adaptation and Evolution Strategically: Computational Game Theory and Opponent Exploitation for Treatment Planning, Drug Design, and Synthetic Biology. *Computational Medicine* conference, Pittsburgh, PA, 10/28/2019.

15. New Results for Solving Imperfect-Information Games. *International Conference on Multiple Criteria Decision Making (MCDM)*, Istanbul, Turkey, June 16–21, 2019.

16. New Results for Solving Imperfect-Information Games. *International Florida Artificial Intelligence Research Society Conference (FLAIRS)*, Sarasota, FL, May 19–22, 2019.

17. New Results for Solving Imperfect-Information Games. *AAAI Conference on Artificial Intelligence (AAAI)*, Honolulu, HI, 1/29/2019–2/1/2019.

18. Super-Human AI for Strategic Reasoning. *World Artificial Intelligence Conference Tencent Sub-forum*, Shanghai, China, 9/18/2018.

19. Safe and Nested Subgame Solving for Imperfect-Information Games. *AGT Fest* at the *ACM Conference on Economics and Computation (EC)*, Cornell University, Ithaca, NY, 6/21/2018.

20. Super-Human AI for Strategic Reasoning. *Silicon Valley Intelligent Systems Summit*, Santa Clara, CA, 1/13/2018.

21. Super-Human AI for Strategic Reasoning. *Cubist Systematic Strategies Quant Conference*, New York City, NY, 11/15/2017.

22. Super-Human AI for Strategic Reasoning. *AI World 2017*, Beijing, China, 11/8/2017.

23. Super-Human AI for Strategic Reasoning. *JD Discovery*, Beijing, China, 11/6/2017. The talk attracted 860,000 live viewers on JD.com alone, and probably around 3,000,000 live viewers overall.

24. AI algorithms for strategic interaction. 3-hour talk at Workshop, Heerlen, The Netherlands, 11/3/2017.

25. The Algorithms Behind the Super-Human AI for Strategic Reasoning: *Libratus* Beats Top Professionals in No-Limit Poker. Brightlands Conference, Heerlen, The Netherlands, 11/2/2017.

26. Super-Human AI for Strategic Reasoning. AI | IA Conference, Business Intelligence and Smart Services Institute, Amsterdam, The Netherlands, 11/1/2017.

27. Super-Human Strategic Reasoning: *Libratus* Beats Top Pros in Heads-Up No-Limit Texas Hold'em. Keynote. *Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting*, Houston, TX, 10/22–10/25, 2017.

28. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. International Joint Conference on Artificial Intelligence (IJCAI), Melbourne, Australia, 8/23/2017.

29. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. O'Reilly AI Conference, NYC, 6/29/2017.

30. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. AAAI Conference on Artificial Intelligence (AAAI), San Francisco, CA, 2/9/2017.

31. Modern Organ Exchanges: Algorithms, Market Designs, and Opportunities. "Data, Dollars, and Algorithms: The Computational Economy" Symposium, annual event hosted by Harvard's Institute for Applied Computational Science, Paulson School of Engineering, Harvard University, 1/19/2017.

32. Journey and New Results in Combinatorial Auctions, Automated Mechanism Design for Revenue Maximization, and Kidney Exchanges. At "Electronic Markets Design: A Symposium in Honor of Tuomas Sandholm", University of Zürich, 4/29/2016.

33. Modern Kidney Exchanges: Matching under Dynamics and Pre-Transplant Edge Failures. Conference on Stochastic Models and Algorithms for Intelligent Business Systems. Jointly organized by the Department of Management Science and Information Systems (MSIS) of Rutgers University and the Department of Applied Mathematics and Statistics of Stony Brook University, together with the Rutgers Center for Operations Research (RUTCOR). Rutgers, NJ, June 6–7, 2014.

34. Poker AI: Algorithms for Creating Game-Theoretic Strategies for Large Incomplete-Information Games. Invited plenary talk at the *National Conference on Artificial Intelligence (AAAI)*, Bellevue, WA, July 14-18, 2013.

35. Expressiveness in Markets: Lessons from Conducting $60 Billion of Very-Large-Scale Generalized Combinatorial Multi-Attribute Sourcing Auctions, and a General Theory. Keynote speech at the Finnish Operations Research Society symposium on Electronic Markets in Logistics and Finance. Aalto University, ECON, Helsinki, Finland, June 12, 2012.

36. Design and Algorithms for Modern Kidney Exchanges. At the *Michael Rothkopf Memorial Conference*, Penn State University, June 1–3, 2009. Keynote speech.

37. Expressiveness in mechanisms and its relation to efficiency: Our experience from $40 billion of combinatorial multi-attribute auctions, and recent theory. At the inaugural *New York Computer Science and Economics Day (NYCE Day)*, *New York Academy of Sciences*, October 3rd, 2008.

38. Expressive Commerce and Its Application to Sourcing: How We Conducted $35 Billion of Generalized Combinatorial Auctions. Keynote Speaker. *International Conference on Electronic Commerce (ICEC)*, Minneapolis, MN, August 20–22, 2007.

39. Expressive Commerce and Its Application to Sourcing: How We Conducted $35 Billion of Generalized Combinatorial Auctions. Keynote Speaker. *3rd International Conference on Algorithmic Aspects in Information and Management (AAIM)*, Portland, OR, June 6–8, 2007.

40. Next Generation Procurement Optimization. Selected finalist presentation for the Edelman award. *INFORMS Conference on O.R. Practice*, Palm Springs, CA, April 18, 2005.

41. Automated Mechanism Design. At the *The Second World Congress of the Game Theory Society (GAMES)*, Marseilles, France, July, 2004.

42. Automated Mechanism Design: A New Application Area for Search Algorithms. *International Conference on Principles and Practice of Constraint Programming (CP).* Cork, Ireland, 9/29–10/3/2003.

43. Making Markets and Democracy Work: A Story of Incentives and Computing. Computers and Thought Award lecture. *International Joint Conference on Artificial Intelligence (IJCAI)*, Acapulco, Mexico, August, 2003.

44. New Results on Computing in Games. Fifth Conference on Logic and the Foundations of the Theory of Games and Decisions (LOFT), Torino, Italy, June 28–30, 2002.

45. Agents in Combinatorial Markets. ACM Autonomous Agents Research Award acceptance talk at the Fifth International Conference on Autonomous Agents (AGENTS), Montreal, Canada, June 1st, 2001.

46. Leveled Commitment Contracts: New Results. *Workshop on Agents for Electronic Commerce and Managing the Internet-Enabled Supply Chain at the Third International Conference on Autonomous Agents (AGENTS)*, Seattle, Washington, May 1, 1999.

47. Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation. *Agents' World Conference.* This talk simultaneously served as a plenary talk for several other conferences and workshops: *International Conference on Multiagent Systems (ICMAS); Second International Workshop on Cooperative Information Agents (CIA): Learning, Mobility and Electronic Commerce for Information Discovery in the Internet; Fifth International Workshop on Agent Theories, Architectures, and Languages (ATAL); Second International Workshop on Intelligent Agents for Telecommunications Applications (IATA); Second International Workshop on Collective Robotics (CRW); First International Workshop on Agents in Communityware (ACW); First International Workshop on Multi-Agent Systems and Agent-Based Simulation (MABS); International Competitions Robocup'98 and FIRA RWC'98.* Cite de Sciences - La Vilette, Paris, France, July 3-8, 1998.

48. Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation. *Agents, Alife and Computational Economics Workshop*. Hewlett Packard Labs, Bristol, UK, June 24-25, 1998.

49. Chosen presenter of the plenary summary of the *Satisficing Models* Symposium to the AAAI Spring Symposium at large. Stanford University, CA, March 24, 1998.

50. Using Economics for Resource Allocation and Control. Second International Workshop on Mobile Agents. Dartmouth College, Hanover, NH, September 19-20, 1997.

Other invited talks at academic conferences
(This list omits most talks given on our work by students, postdocs, and other collaborators.)

1. Multiagent Systems for Social Good: Designing, Building, and Fielding Organ Exchanges. The presenter and discussion leader of the Discussion Session, *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 5/5/2021.

2. Super-Human AI for Strategic Reasoning: Beating Top Professionals in Heads-Up No-Limit Texas Hold'em. *Allied Social Science Associations (ASSA) Annual Meeting* (Econometric Society Winter Meeting), Philadelphia, PA, January 5-7, 2018.

3. Automated Design of High-Revenue Combinatorial Auctions. *INFORMS Annual Meeting*, Phoenix, AZ, November 4–7, 2018.

4. Learning to branch. *INFORMS Annual Meeting*, Phoenix, AZ, November 4–7, 2018.

5. Learning to branch for winner determination in combinatorial auctions. *INFORMS Annual Meeting*, Phoenix, AZ, November 4–7, 2018.

6. A Novel KPD Mechanism to Increase Transplants When Some Candidates Have Multiple Willing Donors. *INFORMS Annual Meeting*, Houston, TX, October 22–25, 2017.

7. Sample Complexity of Multi-Item Profit Maximization. *INFORMS Annual Meeting*, Houston, TX, October 22–25, 2017.

8. Operation Frames and Clubs in Kidney Exchange. *INFORMS Annual Meeting*, Houston, TX, October 22–25, 2017.

9. Scalable Segment Abstraction Method for Advertising Campaign Admission and Inventory Allocation Optimization. *INFORMS Annual Meeting*, Nashville, TN, November 13–16, 2016.

10. Position-Indexed Formulations for Kidney Exchange. *INFORMS Annual Meeting*, Nashville, TN, November 13–16, 2016.

11. Sample Complexity of Revenue Maximization in the Hierarchy of Deterministic Combinatorial Auctions. *INFORMS Annual Meeting*, Nashville, TN, November 13–16, 2016.

12. Toward a Credit Mechanism for Dynamic Kidney Exchange. Invited talk given by my student John Dickerson. *INFORMS Annual Meeting*, Nashville, TN, November 13–16, 2016.

13. Small Representations of Big Kidney Exchange Graphs. Invited talk given by my student John Dickerson. *INFORMS Annual Meeting*, Nashville, TN, November 13–16, 2016.

14. Uncertainty in Dynamic Matching with Application to Organ Exchange. Invited talk given by my student John Dickerson. *INFORMS Annual Meeting*, Nashville, TN, November 13–16, 2016.

15. Multi-Option Descending Clock Auction. *INFORMS Annual Meeting*, Philadelphia, PA, November 1–4, 2015. Invited talk.

16. Simultaneous Abstraction And Equilibrium Finding In Games. *INFORMS Annual Meeting*, Philadelphia, PA, November 1–4, 2015. Invited talk given by my student Noam Brown.

17. Competing Dynamic Matching Markets. *INFORMS Annual Meeting*, Philadelphia, PA, November 1–4, 2015. Invited talk given by my co-author Sanmay Das.

18. Near-Optimal Stochastic Matching With Few Queries. *INFORMS Annual Meeting*, Philadelphia, PA, November 1–4, 2015. Invited talk given by my student John Dickerson.

19. Simultaneous Abstraction and Equilibrium Finding in Games. *International Symposium on Mathematical Programming (ISMP)*, game theory cluster, Pittsburgh, PA, July 12–17, 2015. Invited talk.

20. Combining Human Value Judgments and Machine Learning to Match in Dynamic Environments. *International Symposium on Mathematical Programming (ISMP)*, Pittsburgh, PA, July 12–17, 2015. Invited talk given by my student John Dickerson.

21. Faster First-Order Methods for Extensive-Form Game Solving. *International Symposium on Mathematical Programming (ISMP)*, Pittsburgh, PA, July 12–17, 2015. Invited talk given by my student Christian Kroer.

22. Optimizing Prices in Descending Clock Auctions. *International Symposium on Mathematical Programming (ISMP)*, Pittsburgh, PA, July 12–17, 2015. Invited talk given by my collaborator Tri-Dung Nguyen.

23. Combining Human Value Judgments and Machine Learning to Match in Dynamic Environments. INFORMS Healthcare Conference, Nashville, TN, July 29–31, 2015. I had my student John Dickerson give my invited talk.

24. The Dynamics of Kidney Exchange. Healthcare Operations Management track, POMS (Production and Operations Management Society) 26th Annual Conference, Washington, D.C., May 8–11, 2015. Invited talk given by my student John Dickerson.

25. Experiences from a Large Kidney Exchange, and New Results on Dynamic, Failure-aware, Fair Matching. Session on Kidney Exchange Models. *INFORMS Annual Meeting*, San Francisco, CA, November 9–12, 2014. Invited talk.

26. Optimizing Prices in Descending Clock Auctions. Session on Procurement and Auction Markets, Auctions Cluster, *INFORMS Annual Meeting*, San Francisco, CA, November 9–12, 2014. Invited talk.

27. FutureMatch: Learning to Match in Dynamic Environments. Session on Dynamic Matching Markets, Auctions Cluster, *INFORMS Annual Meeting*, San Francisco, CA, November 9–12, 2014. Invited talk. Talk given by my student John Dickerson.

28. Extensive-Form Game Abstraction with Bounds. Session Game Theory 3, *INFORMS Annual Meeting*, San Francisco, CA, November 9–12, 2014.

29. Kidney Exchange: Present and Future. *INFORMS Annual Meeting*, Minneapolis, MN, October 6–9, 2013. Invited talk.

30. Computational Bundling for Auctions. *INFORMS Annual Meeting*, Minneapolis, MN, October 6–9, 2013. Invited talk.

31. Finding Strong Nash Equilibrium (SNE). *INFORMS Annual Meeting*, Minneapolis, MN, October 6–9, 2013.

32. Failure-aware kidney exchange. *INFORMS Annual Meeting*, Minneapolis, MN, October 6–9, 2013. Invited talk, given by my student John Dickerson.

33. Liver and Multi-Organ Exchange. *INFORMS Annual Meeting*, Minneapolis, MN, October 6–9, 2013. Talk given by my student John Dickerson.

34. Inventory-Based versus Prior-Based Options Trading Agents. Risk-Aversion in Algorithmic Game Theory and Mechanism Design session of the Game Theory cluster at the *International Symposium on Mathematical Programming (ISMP)*, Berlin, Germany, 2012. Talk given by student Abe Othman.

35. Scalability of optimization algorithms, and approaches to the dynamic optimization problem. At the Kidney Paired Donation Consensus Conference, Herndon, VA, March 29, 2012.

36. Lossy Stochastic Game Abstraction with Bounds. *INFORMS Annual Meeting*, Phoenix, AZ, October 14–17, 2012.

37. Dynamic Matching via Weighted Myopia with Application to Kidney Exchange. *INFORMS Annual Meeting*, Computational Stochastic Optimization cluster (co-sponsored by the Computational Stochastic Programming cluster), Phoenix, AZ, October 14–17, 2012. Invited talk. Talk given by student John Dickerson.

38. Profit-Charging Market Makers with Bounded Loss, Vanishing Bid/Ask Spreads, and Unlimited Market Depth. *INFORMS Annual Meeting*, Automated Systems for Analyzing and Designing Auctions session, Phoenix, AZ, October 14–17, 2012. Invited talk.

39. Safe Opponent Exploitation. *INFORMS Annual Meeting*, Phoenix, AZ, October 14–17, 2012. Talk given by student Sam Ganzfried.

40. Optimal Auctions for Spiteful Bidders. *INFORMS Annual Meeting*, Auction Theory session, Phoenix, AZ, October 14–17, 2012. Invited talk.

41. Optimizing Kidney Exchange with Transplant Chains: Theory and Reality. *INFORMS Annual Meeting*, Market Mechanisms and their Applications session, Phoenix, AZ, October 14–17, 2012. Invited talk. Talk given by student John Dickerson.

42. Strategy Purification and Thresholding: Effective Non-Equilibrium Approaches for Playing Large Games. *INFORMS Annual Meeting*, Phoenix, AZ, October 14–17, 2012. Talk given by student Sam Ganzfried.

43. Rational Market Making with Probabilistic Knowledge. *INFORMS Annual Meeting*, Auctions and Private Information session, Phoenix, AZ, October 14–17, 2012. Invited talk.

44. Game Theory-Based Opponent Modeling in Large Imperfect-Information Games. *INFORMS Annual Meeting*, Charlotte, NC, November 13–16, 2011. Invited talk.

45. Envy Quotes and the Iterated Core-Selecting Combinatorial Auction. *INFORMS Annual Meeting*, invited talk, Charlotte, NC, November 13–16, 2011. Talk given by student Abe Othman.

46. Sampling-based Complete Tree Search. *INFORMS Annual Meeting*, Charlotte, NC, November 13–16, 2011.

47. Increasing Revenue in Sponsored Search via Envy-reducing Strategies. *INFORMS Annual Meeting*, Charlotte, NC, November 13–16, 2011. Invited talk.

48. Mixed-bundling Auctions with Reserve Prices. *INFORMS Annual Meeting*, Charlotte, NC, November 13–16, 2011. Invited talk. Talk given by postdoc Pingzhong Tang.

49. Approximating optimal combinatorial auctions for complements using restricted welfare maximization. *INFORMS Annual Meeting*, Charlotte, NC, November 13–16, 2011. Invited talk.

50. Option Trading with Agents that Combine Insights from Prediction Markets and Finance. *INFORMS Annual Meeting*, Charlotte, NC, November 13–16, 2011. Invited talk. Talk given by student Abe Othman.

51. Search Tree Restructuring. INFORMS Annual Meeting, Austin, TX, November 7–10, 2010. Talk given by student Erik Zawadzki.

52. Asymmetric spite in auctions. INFORMS Annual Meeting, Austin, TX, November 7–10, 2010.

53. Envy Quotes and the Iterated Core-Selecting Combinatorial Auction. INFORMS Annual Meeting, Austin, TX, November 7–10, 2010.

54. Computing Equilibria by Incorporating Qualitative Models. INFORMS Annual Meeting, Austin, TX, November 7–10, 2010.

55. On the Computation of Nash Equilibria of Sequential Games. *International Symposium on Mathematical Programming (ISMP)*, Chicago, IL, August 23–28, 2009. Talk given by collaborators.

56. Automated Abstraction and Equilibrium-finding Algorithms for Sequential Imperfect Information Games. *International Symposium on Mathematical Programming (ISMP)*, Chicago, IL, August 23–28, 2009. Talk given by collaborators.

57. Channel Abstraction for Optimized Expressive Advertising Auctions. *INFORMS Annual Conference*, San Diego, CA, October 11–14, 2009. Invited talk.

58. Online Stochastic Optimization in the Large: Application to Kidney Exchange. *INFORMS Annual Conference*, San Diego, CA, October 11–14, 2009.

59. Smoothing techniques for computation of Nash equilibria in sequential games. *INFORMS Annual Meeting*, Washington, D.C., October 12–15, 2008.

60. First-order algorithm with $O(log(1/\epsilon))$ convergence for ϵ-equilibrium in two-person zero-sum games. *INFORMS Annual Meeting*, Washington, D.C., October 12–15, 2008.

61. Theory of expressiveness in mechanism design, with uses in combinatorial auctions and sponsored search. *INFORMS Annual Meeting*, Session on Auctions and Mechanism Design, Washington, D.C., October 12–15, 2008.

62. Beyond the Revelation Principle: Manipulation-Optimal Mechanisms. *INFORMS Annual Meeting*, Session on Applying OR Techniques to politics, Washington, D.C., October 12–15, 2008.

63. Algorithmic generation of strategies for huge imperfect-information games, applied to Texas Hold'em poker. *INFORMS Annual Meeting*, Session on Computational Game Theory, Washington, D.C., October 12–15, 2008.

64. Progress on Using Computational Hardness to Prevent Manipulation. *INFORMS Annual Meeting*, Session Game Theory II, Washington, D.C., October 12–15, 2008. Talk presented by Vincent Conitzer.

65. Expectation-based Versus Potential-aware Automated Abstraction in Imperfect Information Games. *INFORMS Annual Meeting*, Washington, D.C., October 12–15, 2008.

66. Potential-Aware Automated Abstraction of Sequential Games, and Holistic Equilibrium Analysis of Texas Hold'em Poker. *INFORMS Annual Meeting*, Seattle, WA, November, 2007.

67. Online Pricing and Prophet Inequalities. *INFORMS Annual Meeting*, Seattle, WA, November, 2007.

68. Gradient-based algorithms for finding Nash equilibria in extensive form games. *INFORMS Annual Meeting*, Seattle, WA, November, 2007.

69. Automated Design of Multistage Mechanisms. *INFORMS Annual Meeting*, Pittsburgh, PA, November 5–8, 2006. Invited talk.

70. Spiteful Bidding in Sealed-Bid Auctions. *INFORMS Annual Meeting*, Pittsburgh, PA, November 5–8, 2006.

71. A Strong Texas Hold'em Poker Player via Automated Abstraction and Real-time Equilibrium Computation. *INFORMS Annual Meeting*, Pittsburgh, PA, November 5–8, 2006.

72. Common Voting Protocols as Maximum Likelihood Estimators. *INFORMS Annual Meeting*, Pittsburgh, PA, November 5–8, 2006.

73. Algorithms for rationalizability and CURB sets. *INFORMS Annual Meeting*, Pittsburgh, PA, November 5–8, 2006.

74. Mixed-Integer Programming Methods for Finding Nash Equilibria. 16th International Conference on Game Theory, SUNY Stony Brook, NY, July 11-15, 2005. Session on Equilibrium Computation. (Due to my time conflicts, talk given by Andrew Gilpin.)

75. A Generalized Strategy Eliminability Criterion and Computational Methods for Applying It. 16th International Conference on Game Theory, SUNY Stony Brook, NY, July 11-15, 2005. Session on Equilibrium Computation. (Due to my time conflicts, talk given by Vincent Conitzer.)

76. Finding equilibria in large sequential games of incomplete information. *INFORMS Annual Meeting*, session "Game Theoretic Methods in Computer Science and Engineering I" in cluster "Applications of Auction and Game Theory", San Francisco, CA, November 13–16, 2005.

77. Approximating Revenue-Maximizing Combinatorial Auctions. *INFORMS Annual Meeting*, session "Auction and Game Theory" in cluster "Applications of Auction and Game Theory", San Francisco, CA, November 13–16, 2005.

78. Information-theoretic approaches to branching in search. *INFORMS Annual Meeting*, cluster "Contributed Paper Track -72- Optimization Techniques", session "Optimization and Heuristic", San Francisco, November 13–16, 2005.

79. Preference Elicitation in Combinatorial Auctions. At the "Preferences" session of the 8th International Symposium on Artificial Intelligence and Mathematics, Fort Lauderdale, Florida, January 4–6, 2004.

80. Complexity Results about Nash Equilibria. At the "Artificial Intelligence and Game Theory" session of the 8th International Symposium on Artificial Intelligence and Mathematics, Fort Lauderdale, Florida, January 4–6, 2004.

81. Real-World Combinatorial Procurement Auctions. *INFORMS Annual Meeting*, session "Revenue Management and Dynamic Pricing II", cluster "Revenue Management & Dynamic Pricing", Denver, CO, October, 2004. Invited talk.

82. Results about the Complexity of Solving Games. *INFORMS Annual Meeting*, session "New Algorithmic and Complexity Insights into the Nash Equilibrium", cluster "Game Theory", Denver, CO, October, 2004. Invited talk.

83. Winner Determination in Combinatorial Exchanges. At the *Federal Communications Commission's Combinatorial Bidding Conference*, Queenstown, MD, November 21–23, 2003.

84. Bidding Agents with Hard Valuation Problems. *INFORMS Annual Meeting*, session "Software agents applied to automated decision making", Atlanta, October, 2003. Invited talk. Due to limited time, I had my PhD student, Kate Larson, give the talk.

85. Industrial Procurement Auctions with Expressive Competition. *INFORMS Annual Meeting*, session "Combinatorial Auctions", Atlanta, October, 2003. Invited talk. Due to limited time, I had Dr. David Levine give the talk.

86. CABOB: A Fast Optimal Algorithm for Combinatorial Auctions. *INFORMS Annual Meeting*, San Jose, CA, November, 17–20, 2002. Invited talk. Due to my time constraints, I had my co-author David Levine give the talk.

87. Market Clearing Technology for Markets with Expressive Bidding. Second Combinatorial Auction Conference, organized by the FCC, SIEPR, and NSF. At these conferences, the FCC hears experts on how the FCC should design their spectrum auctions. Queenstown, MD, October, 26–28, 2001.

88. Improved Algorithms for Optimal Winner Determination in Combinatorial Auctions & Generalizations. *INFORMS Annual Meeting*, Bidding track, San Antonio TX, November 5–8, 2000. Invited talk.

89. Winner Determination in Combinatorial Auctions. *First International Conference on Information and Computation Economies (ICE)*. Charleston, SC, October 25–28, 1998.

90. Coalition Formation under Costly Computation. *Institute for Operations Research and the Management Sciences (INFORMS) International conference, College on Group Decision and Negotiation, Game Theory and Applications track*. Montreal, Canada, April 26-29, 1998. Invited talk.

91. Automatic Cooperation of Area-Distributed Dispatch Centers in Vehicle Routing. *At the Organization for Economic Cooperation and Development (OECD) Scientific Expert Group TT6 meeting on Advanced Logistics and Information Technology in Freight Transport*, Washington, D.C. Funded invited talk. February 1994.

Invited talks at academic workshops (not including talks given on our work by students, postdocs, and other collaborators)

1. New Results on Real-Time Reasoning in Imperfect-Information Games. *Workshop on New Frontiers of Game (Theoretic) Learning* at the *International Conference on Machine Learning (ICML)*, Seoul, Korea, 7/10/2026.

2. New Results on Subgame Solving in Imperfect-Information Games. Opening keynote. *International Conference on Learning Representations (ICLR)* workshop on *AI for Mechanism Design & Strategic Decision Making (AIMS @ ICLR)*, Rio de Janeiro, Brazil, April 23–27, 2026.

3. Unified Scalable Computational Game Theory. At the Vannevar Bush Faculty Fellowship Summit, Boston, MA, 3/11/2026.

4. Unified Scalable Computational Game Theory. At the Vannevar Bush Faculty Fellowship Summit, University of California San Diego, CA, 11/7/2024.

5. New directions in how computer science can inform the design of economic mechanisms and systems: Automated mechanism design, necessarily exponentially long theories, AI mediators, and fast convergence to high welfare. Workshop on"Algorithms, Approximation, and Learning in Market and Mechanism Design", which is part of the "Mathematics and Computer Science of Market and Mechanism Design" program at the Mathematical Sciences Research Institute (MSRI) at Berkeley, November 6-9, 2023.

6. How can AI inform the design of economic mechanisms and systems? Selected directions: Automated mechanism design, necessarily exponentially long theories, AI mediators, and fast convergence to high welfare. *Keynote.* The Future of AI and Economics workshop at Harvard Business School, 7/31/2023–8/1/2023.

7. Modern Organ Exchanges: Market Designs, Algorithms, and Opportunities. *IJCAI Young Elite Symposium*, *International Joint Conference on Artificial Intelligence (IJCAI)*, 7/4/2023. (Talk given by zoom.)

8. The State of Representing and Solving Games. *Opening keynote.* Workshop on Bridging Game Theory and Machine Learning for Multi-Party Decision Making. DIMACS, Rutgers University, October 27–28, 2022.

9. Modern Organ Exchanges: Designs, Algorithms, and Opportunities. Mini-Symposium on Artificial Intelligence in Biomedical Device Research, Medical University of South Carolina, 2/18/2022.

10. What if we don't know the game? Finding and Certifying (Near-)Optimal Strategies in Black-Box Extensive-Form Imperfect-Information Games. Invited talk in the virtually-held workshop "Agents behaviour in combinatorial game theory", November 16–18, 2021. This is part of the Thematic Semester – The Mathematics of Decision Making at the Centre de Recherches Mathematiques, Canada.

11. Configuring algorithms automatically: From practice to theory. In the *Machine Learning for Algorithms* workshop, organized by the Foundation of Data Science Institute (FODSI) of MIT, UC Berkeley, Harvard, etc., July 13–14, 2021.

12. What Can and Should Humans Contribute to Superhuman AI? AAMAS workshop on Autonomous Agents for Social Good, 5/3/2021.

13. Finding and Certifying (Near-)Optimal Strategies in Black-Box Extensive-Form Imperfect-Information Games. Workshop on Games and Equilibria in System Design and Analysis, which is part of the Theoretical Foundations of Systems workshop at the Simons Institute, University of California Berkeley, 4/9/2021.

14. Superhuman Strategic (= Game-Theoretic) Reasoning Technology for the DoD and Other Government Agencies. Lockheed Martin Advanced Technology Laboratories Neuro-Symbolic Reasoning Workshop, 11/4/2020.

15. Computational Game Theory for Cyber and Electronic Warfare, at the "Autonomy and AI in Cybersecurity Workshop", part of the Army Science Planning and Strategy Meeting, Carnegie Mellon University, Pittsburgh, PA, 8/22/2019.

16. Learning to Solve MIPs Faster: From Practice to Theory. At the workshop on Automated Algorithm Design, Toyota Technical Institute, University of Chicago campus, August 7–9, 2019.

17. Steering Biological Adaptation Strategically. Lightning talk at the *Workshop on the Future of Algorithms in Biology (FAB)*, Carnegie Mellon University, Pittsburgh, PA, 9/28/2018.

18. Solving Large Incomplete-Information Extensive-Form Games, and Beating the Top Human Professionals at Heads-Up No-Limit Texas Hold'em. Keynote at the INFORMS Workshop on Mathematical Optimization in Market Design, Cornell University, Ithaca, NY, June 18-19, 2018.

19. Sample Complexity of Multi-Item Profit Maximization. Conflict Resolution in Decision Making (COREDEMA) workshop at the *International Joint Conference on Artificial Intelligence (IJCAI)*, Melbourne, Australia, 8/21/2017.

20. Sample Complexity of Multi-Item Profit Maximization. Plenary talk at the *Third Marketplace Innovation Workshop*, Graduate School of Business, Stanford University, 6/1/2017.

21. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. Plenary talk at the AAAI Workshop on Computer Poker and Imperfect Information Games, San Francisco, CA, 2/5/2017.

22. Multi-Option Descending Clock Auction. Workshop on Complex Auctions and Practice, (focusing mainly on FCC incentive auctions), Stony Brook, 7/9/2016–7/11/2016.

23. Public Choice and Revenue-Maximizing Combinatorial Auctions: New Results and Automated Mechanism Design. *EXPLORE-2016: The 3rd Workshop on Exploring Beyond the Worst Case in Computational Social Choice*, Singapore, 5/10/2016. Keynote.

24. Modern Organ Exchanges: Generalized Matching under Dynamics, Edge Failures, and Fairness. *7th Workshop on Cooperative Games in Multiagent Systems (CoopMAS)*, Singapore, 5/10/2016. Keynote.

25. The State of Techniques for Solving Large Imperfect-Information Games. Invited plenary talk. Simons Institute for Theoretical Computer Science, semester on Economics and Computation, workshop on Algorithmic Game Theory and Practice, UC Berkeley, 11/16/2015–11/20/2015.

26. Modern Organ Exchanges: Generalized Matching under Dynamics, Edge Failures, and Fairness. Invited plenary talk. Simons Institute for Theoretical Computer Science, semester on Economics and Computation, UC Berkeley, 11/13/2015.

27. Modern Organ Exchanges: Dealing with Dynamics, Failures, and Fairness. Workshop "Towards Better and More Affordable Healthcare: Incentives, Game Theory, and Artificial Intelligence" at the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Paris, France, 5/5/2014. Keynote.

28. Battling Diseases Using Sequential Games. CMU-Microsoft Research Mindswap on CS-econ, New York City, 4/23/2014.

29. Game Abstraction. AAAI Spring Symposium on Applied Computational Game Theory, Stanford University, 3/25/2014.

30. Modern Real-World Dynamic Kidney Exchanges. ESEI Market Design Center, University of Zürich, Switzerland, 7/11/2013. Plenary.

31. Optimization and Market Design. Bell Labs—Carnegie Mellon Green Workshop: Energy-Efficient Computer Systems and Networks, (including Vice President, Head of Research at Alcatel-Lucent), Carnegie Mellon University, 9/9/2011.

32. Core AI Changing the World...with a Narrow Waist...but not Too Narrow. *AI at CMU* Workshop, December 4, 2010.

33. Automatically Generating Game-Theoretic Strategies for Huge Imperfect-Information Games. Army Research Office Workshop on Reasoning in Adversarial and Noncooperative Environments, Duke University, November 18—19, 2010. Long plenary talk.

34. Game Theory-Based Opponent Modeling in Large Imperfect-Information Games. Army Research Office Workshop on Reasoning in Adversarial and Noncooperative Environments, Duke University November 18—19, 2010. Short talk.

35. Computational Thinking for a Modern Kidney Exchange. In the *eScience Workshop*, organized at CMU by Microsoft and CMU, October 15–17, 2009.

36. Languages and Optimization Techniques for Expressive Ad Markets. Distinguished Invited Talk. *Fifth Ad Auctions Workshop* at the *ACM Conference on Electronic Commerce (EC)*, Stanford, CA, 7/6/2009.

37. Expressiveness in mechanisms and its relation to efficiency: Our experience from $40 billion of combinatorial multi-attribute auctions, and recent theory. DIMACS - LAMSADE workshop on Algorithmic Decision Theory, Paris, France, October 28–31, 2008. This talk is on October 31st.

38. Expressiveness in mechanisms and its relation to efficiency: Our experience from $40 billion of combinatorial multi-attribute auctions, and recent theory. 2nd International Workshop on Computational Social Choice (COMSOC), Liverpool, UK, September 3–5, 2008.

39. Solving Sequential Imperfect Information Games and Application to Poker. DARPA ISAT (Information Science and Technology Board) Workshop: Solving Games of National Importance, University of Michigan, Ann Arbor, March 19–20, 2008.

40. Clearing Algorithms for Barter Exchanges: Enabling Nationwide Kidney Exchange. *Wallenberg Symposium* on Medicine, Technology and Economics, Stockholm, Sweden, 10/25/2007.

41. Clearing Algorithms for Barter Exchanges: Enabling Nationwide Kidney Exchange. Dagstuhl seminar on Computational Social Choice, Schloss Dagstuhl, Germany, 10/23/2007.

42. Clearing Algorithms for Barter Exchange Markets: Enabling Nationwide Kidney Exchange. Research Triangle Mini-Workshop on Selected Topics in E-Commerce, 4/9/2007.

43. Expressive Commerce and Its Application to Sourcing: How We Conducted $25 Billion of Generalized Combinatorial Auctions. Research Triangle Mini-Workshop on Selected Topics in E-Commerce, 4/9/2007.

44. Clearing Algorithms for Barter Exchange Markets: Enabling Nationwide Kidney Exchange. DIMACS workshop on Auctions with Transaction Costs, 3/23/2007.

45. Overview of our work on costly valuation computation/information acquisition in auctions: Strategy, counterspeculation, and deliberation equilibrium. DIMACS workshop on Auctions with Transaction Costs, 3/22/2007.

46. Nogood learning for mixed integer programming. *Workshop on hybrid methods and branching rules in combinatorial optimization*, Concordia University, Canada, September 18–22, 2006.

47. Information-theoretic approaches to branching in search. *Workshop on hybrid methods and branching rules in combinatorial optimization*, Concordia University, Canada, September 18–22, 2006.

48. Solving large sequential games of imperfect information, such as poker. NSF ITR team's multi-university workshop, Carnegie Mellon University, Pittsburgh, PA, May 8–9, 2006.

49. Automated Mechanism Design. Games and Theoretical Economics workshop, Northwestern University, October 25–29, 2005.

50. Approximating Revenue-Maximizing Combinatorial Auctions. Workshop on Game Theory and Computer Science, SUNY Stony Brook, NY, July 20–22, 2005.

51. Finding equilibria in large sequential games of incomplete information. Workshop on Game Theory and Computer Science, SUNY Stony Brook, NY, July 20–22, 2005. (I had Andrew Gilpin give the talk.)

52. Complexity of (Iterated) Dominance and Other Noncooperative Solution Concepts. Workshop on Game Theory and Computer Science, SUNY Stony Brook, NY, July 20–22, 2005. (I had Vincent Conitzer give the talk.)

53. Automated Mechanism Design. Dagstuhl seminar on Computing and Markets, Schloss Dagstuhl, Germany, January 3–7, 2005.

54. Eliciting Bid Taker Non-Price Preferences in (Combinatorial) Auctions. *Market Design workshop*, Carnegie Mellon University, Pittsburgh, PA, October 28–29, 2004.

55. Mechanism Design for Computationally Limited Agents. At the *Stanford Institute for Theoretical Economics (SITE)*, workshop on Bounded Rationality in the Design of Markets and Organizations, August 20–23, 2004.

56. Communication Complexity as a Lower Bound for Learning in Games. Russell Sage foundation workshop "New and Alternative Directions in Learning", Carnegie Mellon University, Department of Social and Decision Sciences, August 20–22, 2004. (Due to a time conflict, I had my student give the talk.)

57. Preference Elicitation in Combinatorial Auctions. Dagstuhl seminar on Electronic Market Design, Schloss Dagstuhl, Germany, June 10–14, 2002.

58. Automated Mechanism Design. Cowles Foundation Workshop on Complexity in Economic Theory. Yale University. September 12–14, 2003.

59. Bidding Agents with Complex Valuation Problems in Auctions. DIMACS workshop on Computational Aspects of Game Theory and Mechanism Design. DIMACS, Rutgers University, NJ. 10/31/2001-11/2/2001.

60. Clearing Algorithms and Bidding Agents for Combinatorial Markets. Infonomics Workshop on Electronic Market Design. Maastricht, The Netherlands, July 11–13, 2001.

61. Leveled Commitment Contracts. *Northwestern Summer Microeconomics workshop*, Evanston, IL, July 22–25, 1999.

62. Bargaining with Deadlines. (by Tuomas Sandholm and Nir Vulkan.) *Northwestern Summer Microeconomics workshop*, Evanston, IL, July 22–25, 1999. Talk given by Nir Vulkan.

63. Bargaining with Deadlines. (by Tuomas Sandholm and Nir Vulkan.) *Fifth European Conference on Symbolic and Quantitative Approaches to Reasoning with Uncertainty, Workshop on Decision Theoretic and Game Theoretic Agents*. Talk given by Nir Vulkan. University College London (UCL), London, England, July 5–6, 1999.

64. Multiagent Negotiation and Coalition Formation. *At the Agent-Mediated Electronic Commerce Workshop at the International Conference on Electronic Commerce*, Seoul, Korea, April 6, 1998.

Distinguished lectures and other invited talks, at universities, research labs, etc. (not including invited lectures at conferences and workshops, and not including talks given on our work by students, postdocs, and other collaborators)

1. "Makers of AI" ("Tekoälyn tekijät") Finnish videopodcast, published September, 2026.

2. "Real-Time Reasoning in Imperfect-Information Games". Two 80-minute lectures at the *Game Theory Summer School*, organized by the Kiyv School of Economics (KSE), Ukrainian Catholic University (UCU), and Yuriy Fedkovych Chernivtsi National University, 8/6/2026.

3. "Computational Game Theory AI Products for the Army", at the Army AI Integration Center (AI2C) Quarterly Research & Innovation Council, Pittsburgh, PA 12/17/2025.

4. The State of Representing and Solving Imperfect-Information Games, with a Focus on Real-Time Abstraction Refinement and Reasoning. Google, Mountain View, CA, 1/9/2025.

5. The State of Representing and Solving Imperfect-Information Games, with a Focus on Real-Time Abstraction Refinement and Reasoning. Stanford University, 1/9/2025.

6. Briefing to the *Air Force Scientific Advisory Board* on "DARPA AIR/AI in Autonomous Systems", 11/14/2024, and two deep-dive follow-on briefings.

7. CS Perspectives to OR/AI Integration: 1) The State of Representing and Solving Games and 2) Modern Organ Exchanges: Market Designs, Algorithms, and Opportunities. Overview keynote. Summer school at the nexus of AI and OR. AI-SCORE: Artificial Intelligence School for Computer science and Operations Research Education. Organized by INFORMS. Washington, DC, at UMD, College Park, 5/27/2024.

8. Leadership in STEM. Keynote talk at LEAD@SSA, the leadership conference at Shady Side Academy (a K-12 school), 4/5/2024.

9. Advising the Army Research Office (ARO) on funding directions at the ARO planning workshop, Adelphi, VA, March 3–4, 2024.

10. Presentation "Computational Game Theory AI Products for the Navy" to Office of Naval Research (Navy and USMC), virtual, 2/23/2024.

11. "Advice for Navy & USMC Leaders on AI", Navy OPNAV Strategy and Concepts, Pentagon, 2/14/2024.

12. "Unified Scalable Computational Game Theory & Computational Game Theory AI Products" to Rear Admiral Rothenhaus, head of Office of Naval Research (ONR), at Carnegie Mellon University, Pittsburgh, 1/18/2024.

13. "Computational Game Theory AI Products", Strategic Capabilities Office (SCO), 1/3/2024.

14. "Computational Game Theory AI Products" at the "AI Bootcamp for U.S. Coast Guard Intel Professionals: Implications for National Security", Carnegie Mellon Institute for Strategy and Technology, virtual, 12/14/2023.

15. The State of Representing and Solving Games, with Implications across the DoD. Basic Research Office, Office of the Secretary of Defense (OSD), 6/22/2023. (Virtual.)

16. Presentation "Advice for Admiral Paparo on AI" to ADM Paparo (Commander of the Pacific Fleet) and the US Pacific Fleet, Oahu, HI, May 2023.

17. Presentation "Computational Game Theory Tools for Generating Successful DoD Strategies" to U.S. Marine Corps Forces Pacific, Oahu, HI, May 2023.

18. Modern Organ Exchanges: Market Designs, Algorithms, and Opportunities. Computer Science Department Seminar Series, Missouri University of Science and Technology, 4/17/2023. (Virtual.)

19. The State of Representing and Solving Games. *Distinguished Lecture Series*, Hong Kong Baptist University, 3/22/2023. (Virtual.)

20. Presentation "Computational Game Theory Tools for Generating Successful DoD Strategies" to the Navy and USMC, Pentagon, 2/28/2023.

21. Presentation "Computational Game Theory Tools for Generating Successful DoD Strategies" to USMC, Quantico, 2/27/2023.

22. The State of Representing and Solving Games. Precision Convergence Webinar Series, organized by McGill University Center for the Convergence of Health and Economics and the Pittsburgh Supercomputing Center. 2/15/2023.

23. Presentation "Computational Game Theory Tools for Generating Successful DoD Strategies" to USMC and Strategic Capabilities Office (SCO), 2/3/2023.

24. The State of Representing and Solving Games. MIT EECS, AI & Decision Making. 10/26/2022.

25. Presentation "The Usefulness of Game Theory in Generating Successful Air Force Strategies" given twice on the same day to Air Force Futures, SAF SA, Air Force Badgers, and Air Force Skunks, Pentagon, 9/30/2022.

26. In-person advising session to DARPA team on commercializing DARPA technologies, Pittsburgh, PA, 9/9/2022.

27. What Can and Should Humans Contribute to Superhuman AIs? *Inaugural UNSW.ai Distinguished Lecture*, Distinguished Lecture Series, University of New South Wales (UNSW) AI Institute, Sydney, Australia, 8/15/2022. (Virtual.)

28. Game-theoretic AI Brief and Demonstration, USMC, Pentagon, 6/30/2022.

29. Presentation "Computational Game Theory and Opponent Exploitation AI Products for DoD" and demonstration to USMC Generals, Pentagon, 5/31/2022.

30. "Computational Game Theory and Opponent Exploitation AI Products for DoD", U.S. Army 2022 Artificial Intelligence Autonomous Systems Symposium & Exposition, Pittsburgh Convention Center, 4/5/2022.

31. Several calls to advise Dr. Purush Iyer from the ARO on important topics of the day (such as Ukraine strategy and technology commercialization), 2022.

32. Advised the Army Research Office on game-theoretical aspects of the Russian Ukraine invasion and Russian expansion more broadly, 3/7/2022.

33. Advised the Army Research Office on game-theoretical approaches for research portfolio selection, Spring 2022.

34. "The State of Representing and Solving Games." Air Force Warfighting Integration Capability (AFWIC), Pentagon, 12/10/2021. (Virtual.)

35. What Can and Should Humans Contribute to Superhuman AIs? Guest lecture in Introduction to Artificial Intelligence, in the Zhi Class of students, Institute for Interdisciplinary Information Sciences (IIIS), Tsinghua University, 12/7/2021. (Virtual.)

36. What Can and Should Humans Contribute to Superhuman AIs? *Distinguished Basser Seminar Speaker* School of Computer Science and School of Engineering, The University of Sydney, 11/11/2021. (Virtual.)

37. Invited talk and demonstrations, Joint AI Center (JAIC), Crystal City, 8/13/2021. (Virtual.)

38. What Can and Should Humans Contribute to Superhuman AIs? Computer Science Colloquium Series, Worcester Polytechnic Institute, 4/23/2021. (Virtual.)

39. What Can and Should Humans Contribute to Superhuman AIs? Cross listed as *CS Distinguished Lecture* as well as CAIS (the Center for AI in Society) seminar, University of Southern California, 4/13/2021. (Virtual.)

40. Computational Game Theory and Opponent Exploitation AI Products for COA Generation, Portfolio Planning, Etc. Invited keynote. U.S. Air Force Research Laboratory (AFRL) Autonomy, Command & Control Meeting, March 15–18, 2021. (Virtual.)

41. Ad Campaign Buying and Selling, Inventory Allocation, Scheduling, and Pricing Optimization Systems for Linear TV and Audio, Linear Addressable, CTV, Digital Video and Audio, Display, Mobile, Game, Cross-Media. At the BizlabNXT-Digital & AI Conclave, organized by the Aditya Birla Group, 1/28/2021. (Virtual.)

42. "Game-Theoretic Portfolio Planning Products", Army Futures Command, 12/15/2020. (Virtual.)

43. Featured speaker. Speech title: "Computational Game Theory and Opponent Exploitation AI for Portfolio Planning and COA Generation". AFWERX Accelerate event, US Air Force, 12/11/2020. (Virtual.)

44. Invited talk "Scalable Game-Theoretic COA Generation and Portfolio Planning Products for DoD Applications" at the Army Research Laboratory / Army Research Office workshop on "Collaborative intelligent autonomous actions in a multi-domain engagement against an intelligent adversary: what do we do and do not know?", 12/9/2020-12/10/2020. (Virtual.)

45. "Computational Game Theory AI System for Studying Escalation and De-Escalation", U.S. Strategic Command (USSTRATCOM) Joint Warfare Analysis Center (JWAC), 12/8/2020. (Virtual.)

46. "Computational game theory and opponent exploitation AI for target allocation", to Brigadier General Rafferty and his team, Army AI Task Force, Pittsburgh, PA, 11/20/2020.

47. Configuring algorithms automatically: From practice to theory. Invited talk in the *Discrete Optimization Talks (DOT)* series, Polytechnique Montreal and University of Toronto, 10/2/2020. (Virtual.)

48. "Game-Theoretic and Multiagent AI for COA Planning/Execution and Asset Portfolio Planning/Acquisition" to the Assistant Secretary of the Army for Acquisition Dr. Jette and his team, 8/4/2020.

49. "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning", Office of Naval Research (ONR), Arlington, VA, 3/25/2020. (Virtual.)

50. Superhuman AI for Multiplayer Poker. MIT Operations Research Center Seminar Series, 3/5/2020.

51. "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning", Air Force Warfighting Integrating Capability (AFWIC), 1/27/2020.

52. "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning", U.S. Marine Corps, Pentagon, 1/8/2020.

53. "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning", U.S. Indo-Pacific Command (INDOPACOM), (virtually), 11/6/2019.

54. "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning", U.S. Marine Corps, Carnegie Mellon University, Pittsburgh, PA, 11/6/2019.

55. Invited speaker, "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning", Joint AI Center (JAIC), Crystal City, 10/10/2019.

56. Invited observer, armored brigade breach exercise at the National Training Center (NTC), Ft. Irwin, CA, October 2–3, 2019.

57. "Strategic (= Game-Theoretic) Reasoning Technology for the DoD: Beyond Machine Learning", to Generals Richardson and Easley and their teams, Army Futures Command, Pittsburgh, PA, 9/12/2019.

58. "Advances in Game Theory and AI: Why the Poker Breakthrough is So Important to DOD Strategic Decision Making: Beyond Machine Learning" invited talk t congressional staffers, Pittsburgh, PA, 9/5/2019.

59. Visited Ft. Eustis to give a Keynote Speech "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning" in the TRADOC G2 *Distinguished Lecture Series* and to meet with TRADOC G2 personnel and Generals, 7/23/2019.

60. Invited visitor and expert, Ft. Leavenworth to meet General Lundy to discuss multiple potential roles for AI and computational game theory, 6/3/2019.

61. Invited plenary speaker "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning" and participant, two-day war game on the role of AI for the Army at the Army War College, Carlisle Barracks, PA, April 23–24, 2019.

62. "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD". Invited speaker, Army Science Board, Pittsburgh, PA, 4/19/2019.

63. Invited speaker, Joint AI Center (JAIC), Crystal City, 3/19/2019.

64. Invited roundtable member, Defense Innovation Board public Roundtable on AI Ethics, which was part of the effort that drafted the DoD AI Ethics Principles, 3/14/2019.

65. Invited roundtable member, Defense Innovation Board private roundtable discussion on artificial intelligence, ethics, and national security, 3/13/2019.

66. Invited visitor and expert, Orlando war gaming center (hosted by COL Ed Ballanco) to get briefed on the main war game modeling and simulation tools that the Army uses and to help determine how AI can best be used with them, 2/27/2019.

67. Invited speaker "Superhuman Strategic (= Game-Theoretic) Reasoning Technology for the DoD", Army Science Board, Carnegie Mellon University, 2019.

68. Invited speaker "Superhuman Strategic (= Game-Theoretic) Reasoning Technology for the DoD" Office of Naval Research (ONR), Arlington, VA, 2/6/2019.

69. Invited speaker "Superhuman Strategic (= Game-Theoretic) Reasoning Technology for the DoD" and discussant, Army Science Board two-day meeting on Multi-Domain Operations, Arlington, VA, February 5–6, 2019.

70. Dozens of in-person presentations with the Army, including several with Generals up to 3 stars, 2019.

71. "Superhuman AI for Strategic (= Game-Theoretic) Reasoning for the DoD: Beyond Machine Learning", Air Force Warfighting Integrating Capability (AFWIC), Pentagon, 1/8/2019.

72. Tuomas Sandholm: Poker and Game Theory — Lex Fridman Podcast #12, December 2018. Over 71,000 views on YouTube.

73. Superhuman AI for Game-Theoretic Reasoning: "Strategic Augmentation". Presentation to 3-letter agency, Pittsburgh, PA, 10/29/2018.

74. Superhuman AI for Game-Theoretic Reasoning. For the U.S. Navy, 10/26/2018.

75. Advised and presented to the Defense Advanced Research Projects Agency (DARPA) Director Dr. Steven H. Walker, 9/27/2018.

76. Evening talk and Q&A on AI and the AI Industry at the *World Artificial Intelligence Conference Tencent Sub-forum*, Shanghai, China, 9/17/2018.

77. Presentation to the Chairman of the Joint Chiefs of Staff and his generals (23 stars in the SCIF), "Strategic Reasoning", Pentagon, 8/30/2018.

78. Super-Human AI for Strategic Reasoning. *Distinguished Speaker lecture series*, Microsoft Research AI, Redmond, WA, 8/14/2018.

79. Fireside Chat (one-hour videotaped interview by Eric Horvitz, head of Microsoft Research, posted on social media), Microsoft Research AI, Redmond, WA, 8/14/2018.

80. Advised and presented to the Chairman of the Joint Chiefs of Staff General Joseph F. Dunford, Jr., and the Joint Chiefs of staff, Pentagon, 7/30/2018.

81. Advised and presented to the United States Deputy Secretary of Defense Patrick M. Shanahan and DoD CIO Dana Deasy, Pentagon, 5/21/2018.

82. Super-Human AI for Strategic Reasoning: *Libratus* Beats Top Pros in Heads-Up No-Limit Texas Hold'em. 17th Annual *Distinguished Lecture Series*, 2017–2018, Computer Science Department, Stony Brook University, NY, 5/4/2018.

83. Superhuman AI for Strategic (= Game-Theoretic) Reasoning. Keynote at the Carnegie Mellon University China–US Summit on Innovation and Entrepreneurship, Pittsburgh, PA, 4/14/2018.

84. Super-Human AI for Strategic (= Game-Theoretic) Reasoning, and Applications to the Military, Intelligence, and Cybersecurity. Warfare in 2050 AI Workshop, organized by Telemus Group for the Department of Defense Office of Net Assessment, Arlington, VA, 4/12/2018. (Virtual)

85. Advised and presented to the Chief of Naval Operations (CNO) Admiral John M. Richardson, CMU, 4/5/2018.

86. Superhuman AI for Strategic Reasoning. Keynote at the Analytics Day (a.Day) (for over 1,000 Exxon professionals), ExxonMobil Houston Campus in Spring, TX, 2/15/2018.

87. Superhuman AI for Strategic Reasoning. Keynote at the Silicon Valley Summit on Intelligent Systems, organized by SVC Angel, Santa Clara, CA, 1/13/2018.

88. Super-Human AI for Strategic Reasoning, and Applications to Online Gaming. Shanda Annual Meeting, Palo Alto, CA, 1/29/2018.

89. Advised and presented to the Principal Deputy Director of National Intelligence Sue Gordon, a primary advisor to the Secretary of Defense on intelligence issues and strategies, 1/12/2018.

90. Super-Human AI for Strategic Reasoning. Susquehanna International Group (SIG), Philadelphia, PA, 1/10/2018.

91. Super-Human AI for Strategic Reasoning. Wholeren training, Pittsburgh, PA, 1/4/2018.

92. Multiple days in the Pentagon with officers from the Joint Chiefs of Staff and the Air Force throughout 2018.

93. Sample Complexity of Multi-Item Profit Maximization. Tsinghua University, Beijing, China, 11/7/2017.

94. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. Invited plenary talk at Huawei's executive AI conference, Vancouver, Canada, 10/10/2017.

95. Super-Human AI for Strategic Reasoning. Amazon Tech Talk, Seattle, WA, 10/2/2017.

96. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. Jane Street, NYC, NY, 6/29/2017.

97. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. PDT Partners, NYC, NY, 6/16/2017.

98. Discover Theater: "What's the buzz around artificial intelligence (AI)? Demystifying the AI and deep-learning landscape", VIP Speaker, *Hewlett Packard Enterprise (HPE) Discover* conference, Las Vegas, NV, 6/8/2017.

99. Innovation Spotlight "Amplify human capabilities with artificial intelligence and supercomputing" at the *Hewlett Packard Enterprise (HPE) Discover* conference. My host was Dr. Eng Lim Goh, PhD, Vice President and SGI Chief Technology Officer, HPE, Las Vegas, NV, 6/8/2017.

100. theCube: "Deep Learning and AI" at the *Hewlett Packard Enterprise (HPE) Discover* conference, Las Vegas, NV, 6/6/2017.

101. Spotlight session at the *Hewlett Packard Enterprise (HPE) Discover* conference. My host was Alain Andreoli, Senior Vice President and General Manager, Data Center Infrastructure Group, HPE, Las Vegas, NV, 6/6/2017.

102. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. *Keynote.* Big Tech Day, TNG Technology Consulting, Münich, Germany, 6/2/2017.

103. Ad Campaign Sales, Inventory Allocation, Scheduling, and Pricing Optimization Systems for Linear and Non-Linear TV & Audio, Display, Mobile, Game, Cross-Media. Adobe's Data Science Symposium. San Jose, CA, 6/1/2017.

104. Super-Human AI for Poker. PokerStars, Isle of Man, UK, 3/14/2017.

105. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em, and Applications for the Intelligence Community from a Serial Entrepreneur. *Cyber Meets AI* conference, In-Q-Tel, Arlington, VA, 2/23/2017.

106. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. Apple, Cupertino, CA, 2/10/2017.

107. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. Google Tech Talk, Mountain View, CA, 2/9/2017.

108. Modern Organ Exchanges: Generalized Matching under Dynamics, Edge Failures, and Fairness. School of Computer Science and Engineering, Nanyang Technological University, Singapore, 5/10/2016.

109. Modern Organ Exchanges: Generalized Matching under Dynamics, Edge Failures, and Fairness. Decision Sciences Research Seminar, School of Business, The George Washington University, Washington, DC, 1/19/2016.

110. Learning Generalized Matching Policies for Dynamics, Edge Failures, and Fairness, and Application to the Nationwide Kidney Exchange. Google Tech Talk, Google, Mountain View, CA, 11/17/2015.

111. The State of Techniques for Solving Large Imperfect-Information Games, Including Poker. Microsoft Research, Redmond, WA, 7/22/2015.

112. Optimizing Prices in Descending Clock Auctions. Invited talk at the Federal Communications Commission (FCC), 3/31/2015.

113. Modern Organ Exchanges: Generalized Matching under Dynamics, Edge Failures, and Fairness. *Strachey Lecture (Distinguished Lecture Series)*, University of Oxford, UK, 3/10/2015.

114. New Results on Algorithms for Creating Game-Theoretic Strategies for Large Incomplete-Information Games. Department of Computer Science, University of Oxford, UK, 3/11/2015.

115. On Technology Transfer from University to Startup. Andreessen Horowitz Academic Roundtable, Palo Alto, CA, September 25–27, 2014.

116. Algorithms for Creating Game-Theoretic Strategies for Large Incomplete-Information Games. Yahoo! Labs, Sunnyvale, CA, 3/26/2014.

117. Modern Dynamic Kidney Exchanges. Operations Research Seminar, Tepper School of Business, Carnegie Mellon University, 11/22/2013.

118. Algorithms for Creating Game-Theoretic Strategies for Large Incomplete-Information Games. IEOR-DRO Seminar (joint seminar series between Industrial Engineering & Operations Research and the Decision, Risk, and Operations Division of the Business School), Columbia University, 10/16/2013.

119. Modern Dynamic Kidney Exchanges. IEOR-DRO Seminar (joint seminar series between Industrial Engineering & Operations Research and the Decision, Risk, and Operations Division of the Business School), Columbia University, 10/15/2013.

120. Modern Dynamic Organ Exchanges: Algorithms and Market Design. Inaugural Andreessen Horowitz Academic Roundtable, Palo Alto, CA, September 26–28, 2013.

121. Modern Dynamic Kidney Exchanges. Department of Industrial Engineering and Operations Research, UC Berkeley, 9/26/2013.

122. Algorithms for Creating Game-Theoretic Strategies for Large Incomplete-Information Games. Research on Algorithms and Incentives in Networks (RAIN) seminar, Stanford University, 9/25/2013.

123. Modern Dynamic Kidney Exchanges. Joint seminar of the Department of Economics and the Graduate School of Business, Stanford University, 9/25/2013.

124. Modern Dynamic Kidney Exchanges. *Distinguished Lecture Series.* Department of Computer Science, University of Illinois at Urbana-Champaign. 4/22/2013.

125. Expressive Advertising Markets. Department of Advertising, University of Illinois at Urbana-Champaign. 4/22/2013.

126. Modern Dynamic Kidney Exchanges. *Transplant Grand Rounds,* University of Pittsburgh Medical Center (UPMC), 4/19/2013.

127. Modern Dynamic Kidney Exchanges. *Distinguished Lecture Series.* University of British Columbia. 4/4/2013.

128. Modern Dynamic Kidney Exchanges. CS-ECON Lecture Series. In the Business School, Department of Economics, and Department of Computer Science, Duke University. 11/30/2012.

129. Algorithms for Large Incomplete-Information Games. Computer Science Department (also listed in the Business School and Department of Economics), Duke University. 11/29/2012.

130. Modern Dynamic Kidney Exchanges. *Inaugural lecture* in the *Helsinki Distinguished Lecture Series on Future Information Technology.* The Helsinki Distinguished Lecture Series on Future Information Technology was launched in Autumn 2012 by HIIT, a joint research institute between University of Helsinki and Aalto University.

131. Algorithms for Large Incomplete-Information Games. Department of Computer Science, University of Helsinki, 11/22/2012.

132. Algorithms for Large Imperfect-Information Games, with Potential for Cybersecurity Applications. Talk to the *National Security Agency (NSA)* at the Software Engineering Institute, Pittsburgh, 10/2/2012.

133. Expressiveness in Markets: Lessons from Conducting $60 Billion of Very-Large-Scale Generalized Combinatorial Multi-Attribute Auctions, and a General Theory. 6/29/2012. Trento summer school on "Market Design: Theory and Pragmatics", 6/25/2012–7/6/2012. (I am one of the five invited Guest Lecturers of this international summer school organized among computer scientists, economists, and operations researchers.)

134. (Automated) Market Making, and Applications to Prediction Markets and Financial Markets. 6/28/2012. Trento summer school on "Market Design: Theory and Pragmatics", 6/25/2012–7/6/2012. (I am one of the five invited Guest Lecturers of this international summer school organized among computer scientists, economists, and operations researchers.)

135. Design and Algorithms for Modern Kidney Exchanges. 6/27/2012. Trento summer school on "Market Design: Theory and Pragmatics", 6/25/2012–7/6/2012. (I am one of the five invited Guest Lecturers of this international summer school organized among computer scientists, economists, and operations researchers.)

136. Design and Algorithms for Dynamic Kidney Exchanges. *Distinguished Lecture.* University of California Santa Barbara. 2/17/2012.

137. Algorithms for Large Imperfect-Information Games. *Distinguished Lecture.* University of Southern California. In the *Game Theory and Human Behavior interdisciplinary speaker series* and the *Computer Science Department Distinguished Lecture Series.* 2/15/2012.

138. Combinatorial optimization and advanced market design for electricity markets. ABB/Ventyx, Santa Clara, 11/9/2011.

139. Optimization for display advertising markets. Baidu, Beijing, 10/24/2011.

140. Auction mechanism design for contextual advertising. Baidu, Beijing, 10/26/2011.

141. Key considerations for ad matching. Baidu, Beijing, 10/27/2011.

142. Traffic inventory planning optimization. Baidu, Beijing, 10/28/2011.

143. Combinatorial optimization and advanced market design for power markets. Talk given to the *Carnegie Mellon Electricity Industry Center advisory committee* (a committee of over 20 C-level executives and regulators), 10/19/2011.

144. Algorithms for Large Imperfect-Information Games. Harvard Computer Science Colloquium, Harvard University, 10/13/2011.

145. Algorithms for Large Imperfect-Information Games. Presentation to the US Navy and War College (held at Carnegie Mellon University), 8/19/2011.

146. Design and Algorithms for Modern Kidney Exchanges. University of Toronto, Department of Computer Science, 6/23/2011.

147. Generalized combinatorial auctions and kidney exchanges: Building markets that traded $50 billion ... and some kidneys. In session "Multiagent systems impact the real world" at the "Lesser's 1st 50" seminar, University of Massachusetts at Amherst, Computer Science Department, 4/15/2011.

148. National Living Donor Kidney Exchange. At the 10th Annual Golden Triangle Chapter International Transplant Nurses Society Symposium "Transplant: Up Close and Personal", Pittsburgh, 4/7/2011.

149. Algorithms for Large Imperfect-Information Games. *Distinguished Seminar* in the STIET (Socio-Technical Infrastructure for Electronic Transactions) seminar series, University of Michigan, Ann Arbor, 3/31/2011.

150. Design and Algorithms for Modern Kidney Exchanges. *Distinguished Lecture Series*, University of Massachusetts at Amherst, Computer Science Department. 4/21/2010.

151. Design and Algorithms for Modern Kidney Exchanges. *Distinguished Lecture Series*, University of Southern California, Computer Science Department, 2/11/2010.

152. Design and Algorithms for Modern Kidney Exchanges. Union College, Department of Mathematics. 5/7/2009.

153. Computational Thinking for a Modern Kidney Exchange. Microsoft Research, Redmond, WA. 3/30/2009.

154. Solving Huge Sequential Imperfect-Information Games, with Application to Poker. Intelligence Seminar, Carnegie Mellon University, Computer Science Department. 4/1/2008.

155. Flexible, Scalable Algorithm for Enabling Nationwide Kidney Exchange. United Network for Organ Sharing (UNOS), Richmond, VA, 2/4/2008.

156. Algorithms for Kidney Exchange. Presentation to US Senator Harkin, his entourage, as well as administrators and professors from Carnegie Mellon University and University of Pittsburgh. CMU, 1/14/2008.

157. Clearing Algorithms for Barter Exchanges: Enabling Nationwide Kidney Exchange. *Transplant Grand Rounds*, University Of Cincinnati College of Medicine, Transplantation Division, 8/14/2007.

158. Clearing Algorithms for Barter Exchange Markets: Enabling Nationwide Kidney Exchange. University Of Pittsburgh Medical School, 6/28/2007.

159. Algorithms for solving sequential imperfect information games, and application to poker. Triangle Computer Science *Distinguished Lecturer Series* (Computer Science Departments at Duke University, University of North Carolina at Chapel Hill, and North Carolina State University), 4/9/2007.

160. Clearing Algorithms for Barter Exchange Markets: Enabling Nationwide Kidney Exchanges. Computer Science Departments at Duke University, University of North Carolina at Chapel Hill, and North Carolina State University, 4/9/2007.

161. Expressive Commerce and Its Application to Sourcing: How We Conducted $25 Billion of Generalized Combinatorial Auctions. Computer Science Departments at Duke University, University of North Carolina at Chapel Hill, and North Carolina State University, 4/9/2007.

162. Research at the Agent-Mediated Electronic Marketplaces Lab. CMU–Microsoft Research Mind-Swap on Auctions, Game Theory, and Algorithms, Pittsburgh, PA, 3/26/2007.

163. Expressive Commerce and Its Application to Sourcing: How We Conducted $25 Billion of Generalized Combinatorial Auctions. Center for Analytical Research and Technology (CART) Seminar Series, Tepper School of Business, Carnegie Mellon University, 3/14/2007.

164. How to Surround Yourself with the Right People? Plenary talk at the *2006 Entrepreneurs Base Camp*, organized by Tie Pittsburgh, 5/6/2006.

165. Technology for Identifying Tipping Points. Presentation to top management (including the president and one of the two main owners) of Mars, Inc. and others at Mars, Inc., Mclean, VA, 2/16/2006.

166. Automated Mechanism Design. Industrial Engineering Department, SUNY Buffalo, 10/14/2005.

167. Automated Mechanism Design. *Distinguished Lecture Series.* University of Massachusetts at Amherst, Department of Computer Science, 5/26/2005.

168. Thoughts about Founding a VC-Backed Company: Experiences from CombineNet, Inc. At the Tie (The IndUS Entrepreneurs) Pittsburgh *Two Paths* event, 12/3/2003.

169. Thoughts on Positioning Pittsburgh in the Global Marketplace. 30-minute invited talk at the Cornerstone Symposium on Positioning Pittsburgh in the Global Marketplace. Organized by the Pittsburgh Regional Alliance. Pittsburgh, 9/24/2003.

170. Making Markets and Democracy Work: A Story of Incentives and Computing. School of Computer Science *Distinguished Lecture*. Carnegie Mellon University. 9/18/2003.

171. Expressive Competition: Its Advantages and the Technology to Enable It. Carnegie Mellon West, Innovation Series, San Francisco, California. 5/28/2003.

172. Game theory: A brief survey of some classic and recent topics. Invited lecture in Prof. Jaime Carbonell's Introduction to AI class, Carnegie Mellon University. 4/24/2003.

173. Achieving New Competitive Advantage: Expressive Competition and the Technology to Enable It. Workshop on High Speed Decision Guidance: Gaining New Competitive Advantage with Combinatorial Science, at the Electronic Procurement Conference, organized by the Conference Board. Chicago, IL, 4/7/2003.

174. Competitive Advantage via Adopting Combinatorial Science. *Purchasing and Supply Leadership Council II Winter Meeting*, organized by the Conference Board. Thousand Oaks, CA, 2/25/2003.

175. Select Issues in Computing in Games: Voting Protocols that Are Hard to Manipulate, Complexity of Finding Equilibria, and Automated Mechanism Design. University of Toronto, Computer Science Department. 2/13/2003.

176. New Results on Computing in Games. University of Helsinki, Computer Science Department, Finland. 1/20/2003.

177. New Results on Computing in Games. Information Networking Institute (INI) Research Seminar Series. Carnegie Mellon University. 12/2/2002.

178. Equilibrium Strategies for Bidders with Hard Valuation Problems. Penn State University. 4/12/2002.

179. Clearing Algorithms, Bidding Agents, and Bid Elicitation in Combinatorial Auctions. Guest lecture in the course "Auctions: Economic & IS Issues", by Profs. Akhilesh Bajaj and Angela Hung, Heinz School of Public Policy, Carnegie Mellon University.

180. Issues in the Intersection of Mechanism Design and Complexity. Carnegie Mellon University, Theory / ALADDIN seminar series, 11/16/2001.

181. Combinatorial Auctions and Exchanges in Electronic Commerce. National Institute of Standards and Technology, Washington, D.C. 1/25/2001.

182. Self-Interest and Limited Computation: Designing Electronic Marketplaces. Nokia Research Center, Helsinki, Finland. 6/19/2000.

183. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. Carnegie-Mellon University, Department of Computer Science. 5/17/2000.

184. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. Columbia University, Department of Computer Science. 5/3/2000.

185. Combinatorial Auctions and Exchanges: Enabling Technology and Generalized Market Designs. Cornell University, Johnson School of Business. 4/19/2000.

186. Self-Interest and Limited Computation: Designing Electronic Marketplaces. Cornell University, Johnson School of Business. 4/19/2000.

187. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. Cornell University, Department of Computer Science. *Distinguished Lecture Series.* 4/18/2000.

188. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. University of Illinois, Urbana-Champaign, Department of Computer Science. 4/9/2000.

189. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. Rice University, Department of Computer Science. 4/3/2000.

190. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. University of Southern California, Department of Computer Science. 3/30/2000.

191. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. Duke University, Department of Computer Science. 3/27/2000.

192. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. University of Massachusetts, Amherst, Department of Computer Science. 3/22/2000.

193. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. University of California, Los Angeles, Department of Computer Science. 3/16/2000.

194. Self-Interest and Limited Computation: Designing Electronic Marketplaces. New York University, Department of Computer Science. 3/9/2000.

195. Self-Interest and Limited Computation: Designing Electronic Marketplaces. University of Maryland, College Park, Department of Computer Science. 2/28/2000.

196. Self-Interest and Limited Computation: Designing Electronic Marketplaces. University of Pennsylvania, Department of Computer and Information Systems. 2/24/2000.

197. Self-Interest and Limited Computation: Designing Electronic Marketplaces. University of Pennsylvania, Department of Systems Engineering. 2/13/2000.

198. Leveled Commitment Contracts for Automated Negotiation: A Backtracking Instrument for Multiagent Systems. Stanford University, Department of Computer Science. 1/12/2000.

199. Electronic Commerce Research at Washington University, Department of Computer Science. Presentation of my research group's work to the Washington University School of Engineering and Applied Science National Council (a collection of senior executives that help plan the future of the school), 10/21/1999.

200. *eMediator*: A Next Generation Electronic Commerce Server. *University of Illinois at Urbana-Champaign*, Department of Computer Science. 10/12/1999.

201. An Algorithm for Optimal Winner Determination in Combinatorial Auctions. At the Center for Optimization and Semantic Control, Department of Systems Science and Mathematics, Washington University, 4/15/1999.

202. *eMediator*: A Next Generation Electronic Commerce Server. *Microsoft Research*. 3/15/1999.

203. Winner Determination in Combinatorial Auctions. *Washington University Mathematical Economics seminar series*, Department of Economics, 12/8/1998.

204. Winner Determination in Combinatorial Auctions. *University of Arizona*, Experimental Economics Laboratory. 10/12/1998.

205. Agents in Electronic Commerce: Component Technologies for Automated Negotiation and Coalition Formation. *Queen Mary & Westfield College*, Department of Electronic Engineering, London, UK. 6/23/1998.

206. Coalitions under Costly Computation. Washington University, Center for Optimization and Semantic Control, Department of Systems Science and Mathematics, 4/22/1998.

207. Negotiation among Computationally Limited Self-Interested Agents. *Stanford Research Institute*. 3/25/1998.

208. Negotiation among Computationally Limited Self-Interested Agents. *Carnegie Mellon University*. Computer Science Department, AI Seminar series. 2/10/1998.

209. Coalitions under Costly Computation. *Washington University Computational Neuroscience seminar series*, 12/9/1997.

210. Advantages of a Leveled Commitment Contracting Protocol. *Washington University Mathematical Economics seminar series*, Department of Economics, 12/2/1997.

211. Algorithms for Computer Chess. Washington University, Department of Computer Science, invited talk in CS313A Artificial Intelligence Laboratory, 10/8/1997.

212. Negotiation among Computationally Limited Self-Interested Agents. DARPA Young Investigator Workshop. Providence, RI, 7/28, 1997.

213. Negotiation among Computationally Limited Self-Interested Agents. *University of Michigan*. Business School, Computer and Information Systems Department. 3/11/1997.

214. Negotiation among Computationally Limited Self-Interested Agents. *University of Pennsylvania*. The Wharton School, Operations and Information Management Department. 2/26/1997.

215. Negotiation among Computationally Limited Self-Interested Agents. *Lund University*, Sweden. Department of Computer Science. 2/11/1997.

216. Negotiation among Computationally Limited Self-Interested Agents. *University of Pennsylvania*. Computer and Information Science Department. 11/25/1996.

217. Negotiation among Computationally Limited Self-Interested Agents. *University of Waterloo*. Department of Computer Science. 4/11/1996.

218. Negotiation among Computationally Limited Self-Interested Agents. *University of Pittsburgh*. Department of Computer Science. 4/2/1996.

219. Negotiation among Computationally Limited Self-Interested Agents. *Columbia University*. Department of Computer Science. 3/20/1996.

220. Negotiation among Computationally Limited Self-Interested Agents. *Washington University*. Department of Computer Science. 3/7/1996.

221. Computerizing Negotiations among Freight Carrier Companies. *Information Technology and Logistics seminar*. Helsinki University of Technology, Espoo, Finland. 1992.

TALKS AT HOME UNIVERSITY AND REGIONAL OUTREACH

(not including talks given on our work by students, postdocs, and other collaborators)

1. AI for Organ Exchanges and Heart Allocation Policy Optimization. Opening keynote of the *Algorithms with A Purpose* hackathon (*AWAP* 2026). Carnegie Mellon University, Pittsburgh, PA, 1/31/2026.

2. AI in Sourcing Auctions, Kidney Exchange, and Defense. Guest lecture and host at CMU for Shadyside Academy Senior School (i.e., high school) course "AI Revolution: Shaping the Future of Society", 5/19/2025.

3. The State of Representing and Solving Imperfect-Information Games, with a Focus on Real-Time Abstraction Refinement and Reasoning. CMU Data Science Club (a student organization), at their Poker AI Competition, 3/22/2025.

4. The State of Representing and Solving Games. CMU Data Science Club (a student organization), at their Poker AI Competition, 3/30/2024.

5. "Computing Optimal Equilibria and Mechanisms via Learning in Zero-Sum Extensive-Form Games." Economics Micro Theory Seminar, Tepper School of Business, CMU, 1/26/2024.

6. Introduction to Generative AI, and Confronting Large Language Model (LLM) Reward Model Overoptimization with Constrained Reinforcement Learning from Human Feedback (RLHF). CMU INFORMS student chapter and the Pittsburgh INFORMS professional chapter and CMU more generally. 11/29/2023.

7. Invited talk "Modern Organ Exchanges: Market Designs, Algorithms, and Opportunities" in the course "Ethics and Robotics" organized by Profs. Illah Nourbakhsh and Jordan Mroziak, Pittsburgh, PA, 4/20/2023.

8. Invited talk "Organ Exchanges" at the CMU Board of Trustees meeting, Pittsburgh, PA, 2/16/2023.

9. Invited talk "Organ Exchanges" at the CMU Presidential Tour, Pittsburgh, PA, 12/1/2022.

10. Invited talk "Modern Organ Exchanges" at the CMU K-12 Summit on AI for Social Good, 4/30/2022.

11. Invited talk "Machine Learning for MIP" at the annual review meeting of CMU's Center for Advanced Process Decision Making, 3/10/2020.

12. Guest lecture "Superhuman AI for Multiplayer Poker" in Prof. Ozan Tonguz's course Engineering Applications of AI, 3/4/2020.

13. "Machine Learning for MIP" at the Dr. Egon Balas Academic Symposium & Memorial, Carnegie Mellon University, Tepper School of Business, 10/28/2019.

14. Guest lecture "Superhuman AI for Strategic Reasoning" in Prof. Randy Bryant's CMU course 15-418/618 "Parallel Computer Architecture and Programming", 4/8/2019.

15. Optimization-Based AI Ethics: A Kidney Exchange Case Study in Combining Human Value Judgments and Machine Learning to Optimize in Dynamic Environments. Guest lecture in Prof. Fei Fang's CMU course "AI Methods for Social Good", 2/26/2019.

16. Two repeat guest lectures "Superhuman AI for Strategic Reasoning" in Mark Stehlik's CMU course 15-110 "Principles of Computing", 11/16/2018.

17. Guest lecture "Superhuman AI for Strategic Reasoning" in Prof. Randy Bryant's CMU course 15-418/618 "Parallel Computer Architecture and Programming", 4/9/2018.

18. Video for discussion initiation of the "Equity of Access & Equity of Impact" session of the CMU - K&L Gates Conference on Ethics & AI, April 9-10, 2018.

19. Guest lecture on kidney exchange in Prof. Fei Fang's new CMU course "AI Methods for Social Good", 3/1/2018.

20. *Startups for Seniors* (i.e., fourth-year students) panel, Entrepreneurship Week, CMU, 11/16/2017.

21. Poster on our organ exchange work at CMU's *50th Anniversary Expo*, November 9–11, 2017.

22. Update on My Lab's Research and Fielding in Organ Exchanges. Presentation to Ed Lazowska, Andy van Dam, Raj Reddy, etc., CMU, 9/9/2017.

23. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. Presentation to Ed Lazowska, Andy van Dam, Raj Reddy, etc., CMU, 9/9/2017.

24. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. CMU Alumni Association, hosted at 2σ, New York, NY, 6/15/2017.

25. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. Machine Learning Seminar. Machine Learning Department, Carnegie Mellon University, 4/25/2017.

26. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. CMU Summit on US-China Innovation & Entrepreneurship, 4/15/2017. Keynote.

27. Super-Human AI for Strategic Reasoning: Beating Top Pros in Heads-Up No-Limit Texas Hold'em. CMU Alumni Association Board meeting, CMU, Pittsburgh, PA, 2/26/2017.

28. Ad Campaign Sales and Inventory Allocation Optimization Systems for TV (linear and digital), Internet Display, Radio, Mobile, Cross-Media. CMU Summit on US-China Innovation & Entrepreneurship, 4/9/2016. Keynote.

29. "Two mini-talks: 1) kidney exchange, and 2) steering evolution and biological adaptation strategically". Invited presentation to Harvey Fineberg, President of the *Gordon and Betty Moore Foundation*, 2/25/2016.

30. "Selected Research and Fielded Applications from the Electronic Marketplaces Lab: Combinatorial Markets (for Sourcing and Ad Campaign Sales); Organ Exchanges; Technology for Incomplete-Information Games" at the visit of EVP Harry Shum from Microsoft, organized by Raj Reddy, 11/9/2015.

31. "Selected Research and Fielded Applications from the Electronic Marketplaces Lab: Combinatorial Markets (for Sourcing and Ad Campaign Sales), Organ Exchanges, and Poker" at the "Post-CSD50 Show Them Your Stuff Event" organized by Raj Reddy for visiting NAE members, 10/24/2015.

32. Steering Evolution and Biological Adaptation Strategically: Computational Game Theory and Opponent Exploitation for Treatment Planning, Drug Design, and Synthetic Biology. At the CSD50 event to celebrate the 50th birthday of the Computer Science Department at Carnegie Mellon University, 10/24/2015.

33. Modern Organ Exchanges: Matching under Dynamics, Edge Failures, and Fairness. Heinz College Faculty Research Seminar, Carnegie Mellon University, Pittsburgh, 4/14/2014.

34. Modern Dynamic Kidney Exchanges. At the Launch|CMU event, Carnegie Mellon University, Pittsburgh, 11/13/2013.

35. Modern Dynamic Kidney Exchanges. Algorithmic Economics Seminar. (The series has three talks per semester, which are typically by distinguished visitors from outside CMU.) 4/16/2013.

36. Some of Prof. Tuomas Sandholms groups healthcare-related projects: 1) Kidney exchange, 2) Expressive markets for health insurance and healthcare provisioning, 3) Sequential game theory for treatment of a patient over time / drug design. Talk at the Personalized Medicine Initiative Meeting between University of Pittsburgh Medical Center and Carnegie Mellon University, 1/24/2013.

37. Expressiveness in mechanisms: Experience from combinatorial multi-attribute auctions, recent theory, and open questions. CMU-MSR (Microsoft Research) Mindswap, 5/15/2012.

38. "Getting to know you" talk. CMU-MSR (Microsoft Research) Mindswap, 5/14/2012.

39. Research at the Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 9/4/2014. Immigration course talks in later years not listed.

40. Research at the Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 9/3/2013.

41. Research at the Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 8/30/2012.

42. Research at the Agent-Mediated Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 8/30/2011.

43. Research at the Agent-Mediated Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 8/24/2010.

44. Research at the Agent-Mediated Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 9/3/2009.

45. Research at the Agent-Mediated Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 8/27/2008.

46. Solving sequential imperfect information games and application to poker. CMU CSD Open House talk, 3/28/2008.

47. Research at the Agent-Mediated Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 9/5/2007.

48. Research at the Agent-Mediated Electronic Marketplaces Laboratory. CMU CSD Immigration course talk, 9/6/2005.

49. Automated Mechanism Design. Talk at the CMU Computer Science Department faculty meeting, 2/2/2005.

50. Combinatorial Exchanges with Preference Elicitation for Task and Resource Allocation among Robots. Carnegie Mellon University, Robotics Institute's 25th Anniversary celebration: Robots and Thought. 10/12/2004.

51. Research in the Agent-Mediated Electronic Commerce Laboratory. CMU Immigration course talk, 8/31/2004.

52. Research in the Agent-Mediated Electronic Commerce Laboratory. CMU Immigration course talk, 9/2003.

53. Research in the Agent-Mediated Electronic Commerce Laboratory. CMU Immigration course talk, 9/2002.

54. Research in the Agent-Mediated Electronic Commerce Laboratory. CMU Immigration course talk, 9/2001.

55. Agents in Combinatorial Markets. Carnegie Mellon University, School of Computer Science. 5/22/2001.

56. Coalition structure generation with worst case guarantees. Washington University, Department of Computer Science, Faculty Research Review presentation to students, 10/16/1998.

57. On the Gains and Losses of Speculation in Equilibrium Markets. Washington University, Department of Computer Science, Faculty Research Review presentation to students, 10/17/1997.

58. Negotiation among self-interested agents. Washington University, Department of Computer Science Faculty Research Review presentation to students, 10/18/1996.

59. Presentation at ARPA site visit. University of Massachusetts at Amherst, Department of Computer Science, 1994.

60. 3 presentations to funding sources, including Technology Development Center of Finland and industry representatives. At the Technical Research Centre of Finland, Laboratory for Information Processing, 1992.

TUTORIALS (reviewed and/or invited)

1. AI and Military AI. Tutorial for the United States Marine Corps, Stafford, VA, 6/26–6/27/2023.

2. New Frontiers of Automated Mechanism Design for Pricing and Auctions. Half-day tutorial (with Nina Balcan and student Ellen Vitercik) at the *AAAI Conference on Artificial Intelligence (AAAI)*, 2/3/2021.

3. New Frontiers of Automated Mechanism Design for Pricing and Auctions. Half-day tutorial (with student Ellen Vitercik) at the *AAAI Conference on Artificial Intelligence (AAAI)*, New York, New York, 2/7/2020.

4. New Frontiers of Automated Mechanism Design for Pricing and Auctions. Half-day tutorial at the *International Joint Conference on Artificial Intelligence (IJCAI)*, Macau, China, 8/11/2019.

5. New Frontiers of Automated Mechanism Design for Pricing and Auctions. Half-day tutorial (with Nina Balcan and our student Ellen Vitercik) at the *ACM Conference on Economics and Computation (EC)*, Phoenix, AZ, 6/24/2019.

6. New Frontiers of Automated Mechanism Design for Pricing and Auctions. Half-day tutorial (with Nina Balcan and our student Ellen Vitercik) at the *Annual ACM Symposium on the Theory of Computing (STOC)*, Phoenix, AZ, 6/23/2019.

7. New Frontiers of Automated Mechanism Design for Pricing and Auctions. Half-day tutorial (with Nina Balcan and our student Ellen Vitercik) at the *AAAI Conference on Artificial Intelligence (AAAI)*, Honolulu, Hawaii, 1/27/2019.

8. Machine Learning in Automated Mechanism Design for Pricing and Auctions. Half-day tutorial (with Nina Balcan and our student Ellen Vitercik) at the *International Conference on Machine Learning (ICML)*, Stockholm, Sweden, 7/10/2018.

9. AI tutorial. For Shougang executives, Carnegie Mellon University, 1/4/2018.

10. *Organ Exchanges: A Fielded Testbed for AI & Healthcare.* Half-day tutorial (with my student John Dickerson) at the *International Joint Conference on Artificial Intelligence (IJCAI)*, New York City, NY, 7/9/2016.

11. *Organ Exchanges: A Fielded Testbed for AI & Healthcare.* Half-day tutorial (with my student John Dickerson) at the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Singapore, 5/9/2016.

12. *Organ Exchanges: A Fielded Testbed for AI & Healthcare.* Half-day tutorial (with my student John Dickerson) at the *AAAI Conference on Artificial Intelligence (AAAI)*, Phoenix, AZ, 2/12/2016.

13. *Recent (2011-13) Results in Sponsored Search Auction Design.* One-day tutorial at Baidu, Beijing, August 5th, 2013.

14. *Selected Topics in Sponsored Search Auction Design.* Four-day tutorial at Baidu, Beijing, September 7–10, 2010.

15. *Baidu Marketplace Design Tutorial.* Four-day tutorial at Baidu, Beijing, February 24–27, 2009.

16. *Expressive Commerce and Its Application to Sourcing: Experiences from Conducting over $40 Billion of Generalized Combinatorial Auctions.* INFORMS Annual Meeting, Washington D.C., October 12–15, 2008.

17. *Market Clearing Algorithms.* Half-day tutorial at the International Joint Conference on Artificial Intelligence (IJCAI), Edinburgh, Scotland, 7/31/2005.

18. *Market Clearing Algorithms.* Half-day tutorial at the National Conference on Artificial Intelligence (AAAI), Pittsburgh, PA, 7/9/2005.

19. *Market Clearing Algorithms.* Half-day tutorial at the ACM Conference on Electronic Commerce (EC), Vancouver, Canada, 6/5/2005.

20. *Market Clearing Algorithms.* Half-day tutorial at the National Conference on Artificial Intelligence (AAAI), San Jose, CA, 7/2004.

21. *Market Clearing Algorithms.* Half-day tutorial at the International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), New York, NY, 7/2004.

22. *Market Clearing Algorithms.* Half-day tutorial at the ACM Conference on Electronic Commerce (EC), New York, NY, 5/17/2004.

23. *Market Clearing Algorithms.* Half-day tutorial at the International Joint Conference on Artificial Intelligence (IJCAI), Acapulco, Mexico, 8/11/2003.

24. *Algorithms for combinatorial auctions and exchanges.* Half-day tutorial at the National Conference on Artificial Intelligence (AAAI), Edmonton, Alberta, Canada, 7/28-8/1/2002.

25. *Market Clearing Algorithms.* Half-day tutorial at the International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), Bologna, Italy, July 2002.

26. *Economically Founded Multiagent Systems.* Full-day tutorial at the European Agent Systems Summer School (EASSS), Bologna, Italy, 7/8-7/12/2002. (Organized by the AgentLink network.)

27. *Economically Founded Multiagent Systems.* Half-day tutorial at the International Joint Conference on Artificial Intelligence (IJCAI), Seattle, WA, 8/5/2001.

28. *Agent-Mediated Electronic Commerce.* Full-day tutorial at the Fifth International Conference on Autonomous Agents (AGENTS), Montreal, Canada, 5/28/2001.

29. *Advanced Electronic Marketplaces for Resource Allocation.* Half-day tutorial at Raytheon, Denver, CO, 4/18/2001.

30. *Foundations of Electronic Marketplaces.* Half-day tutorial at the ACM Conference on Electronic Commerce (EC), Minneapolis, MN, 10/17/2000.

31. *Foundations of Electronic Markets.* Full-day tutorial at Pavillion Technologies, Austin, TX, 8/5/2000.

32. *Foundations of Electronic Markets.* Half-day tutorial at the National Conference on Artificial Intelligence (AAAI), Austin, TX, 7/30/2000.

33. *Economically Founded Multiagent Systems.* Half-day tutorial at the International Conference on Multi-Agent Systems (ICMAS), Boston, MA, 7/9/2000.

34. *Agents in Electronic Markets.* Full-day tutorial at the Fourth International Conference on Autonomous Agents (AGENTS), Barcelona, Spain, 6/4/2000.

35. *Agents in Electronic Markets.* 3 days of lectures as a summer school to industry and academia. EPFL Lausanne, Switzerland, 8/23-8/25, 1999.

36. *Distributed Rational Decision Making.* 10 hours of lectures at the First European Agent Systems Summer School (EASSS'99), Utrecht/Amsterdam, The Netherlands, 7/26-7/30, 1999.

37. *Economically Founded Multiagent Systems.* Half-day tutorial at the International Joint Conference on Artificial Intelligence (IJCAI), Stockholm, Sweden, 8/2/1999.

38. *Economically Founded Multiagent Systems.* Half-day tutorial at the National Conference on Artificial Intelligence (AAAI), Orlando, FL, 7/18/1999.

39. *Agents in Electronic Markets.* Full-day tutorial at the Third International Conference on Autonomous Agents (AGENTS), Seattle, WA, 5/2/1999.

40. *Economically Founded Multiagent Systems.* Tutorial at the National Conference on Artificial Intelligence (AAAI), Madison, WI, 7/27/1998.

41. *Agents in Electronic Markets.* 4 hour tutorial at the Second International Conference on Autonomous Agents (AGENTS), Minneapolis, MN, 5/9/1998.

42. *Agent-Mediated Electronic Commerce.* 3 hour tutorial at the International Conference on Electronic Commerce (ICEC), Seoul, Korea, 4/7/1998.

43. *Agents in Electronic Markets.* 8.5 hour tutorial at the Horizon Systems Laboratory, Mitsubishi Electric Information Technology Center America, Waltham, MA, 10/15/1997.

44. *Economically Founded Multiagent Systems.* 4 hour tutorial at the International Joint Conference on Artificial Intelligence (IJCAI), Nagoya, Japan, 8/23/1997.

45. *Agents in Electronic Markets.* 8.5 hour tutorial at the Agents Group, Hewlett-Packard Labs, Bristol, UK, 8/5/1997-8/6/1997.

46. *Agents in Electronic Markets.* 1.5 hour tutorial at BusinessBots, Inc, (Mitsubishi Electric premises, San Jose, CA), 5/19/1997.

47. *Agents in Electronic Markets.* 8.5 hour tutorial at the First International Conference on Autonomous Agents (AGENTS), Marina del Rey, CA, 2/5/1997.

INVITED PANELIST

1. "Science Entrepreneurship & Technology Transfer Panel" at the Vannevar Bush Faculty Fellowship Summit, Boston, MA, 3/11/2026.

2. "AI 2050 Special Session", *Midwest ML Symposium (MMLS25).* Chicago, IL, 6/23/2025.

3. "AI for National Security: What's the Urgency?" panel, AI Horizons PGH Summit, 10/14/2024.

4. Panel at the *Agentic Markets Workshop* at the *International Conference on Machine Learning (ICML)*, 2024.

5. Panel at AI-SCORE: Artificial Intelligence School for Computer science and Operations Research Education, Washington, D.C., UMD campus, 5/27/2024.

6. "The past, the present and the future of AI/ML" panel, CMU Auton Lab 30-year celebration, 9/8/2023.

7. Academic panel "Games Over AI Agents" for Army Science Board study on "Testing, Validating, and Protecting Army Use of Artificial Intelligence (AI) and Machine Learning (ML) Models", 6/28/2023.

8. Invited talk "Lessons learned from AI defeating the top poker players in the world and from applying game-theoretic reasoning to DoD problems since then" at the Artificial Intelligence Panel at the Character of Warfare 2035 event, Army Futures Command, 11/18/2020.

9. Defense Innovation Board public roundtable to support their efforts to develop proposed principles for ethical and responsible use of AI by the Department of Defense, Pittsburgh, PA, 3/14/2019.

10. Defense Innovation Board private roundtable discussion on artificial intelligence, ethics, and national security, Pittsbugh, PA, 3/13/2019.

11. Panel at the AAAI-19 Workshop on Reinforcement Learning in Games, Honolulu, HI, 1/28/2019.

12. "AI/ML For Business and Society Panel" at the INFORMS Annual Meeting, Phoenix, AZ, 11/4/2018.

13. "Applying Artificial Intelligence" panel for the Department of Defense at the Software Engineering Institute's Research Review, Pittsburgh, PA, 10/9/2018.

14. "The Impact of Artificial Intelligence in Pittsburgh and Beyond" panel at Shadyside Academy, 10/9/2018.

15. Panel at the *World Artificial Intelligence Conference Tencent Sub-forum*, Shanghai, China, 9/18/2018.

16. "Algorithmic Game Theory and (vs.) Machine Learning" panel at the *AAMAS-IJCAI Workshop on Agents and Incentives in Artificial Intelligence (AIˆ 3)*, Stockholm, Sweden, 7/15/2018.

17. Panel co-hosted by Geekwire and Duolingo, 2/13/2018.

18. Panel on AI in Defense and Competitiveness, on the Hill, Washington D.C., 1/16/2018.

19. *Better Than Us? Humanity's Place in an AI-Driven World* panel at the Thrival Innovation keynote, Pittsburgh, PA, 9/27/2017.

20. *Future of AI* panel at the Industry Day at the *International Joint Conference on Artificial Intelligence (IJCAI)*, Melbourne, Australia, 8/25/2017.

21. *AI Lounge* at the *International Joint Conference on Artificial Intelligence (IJCAI)*, Melbourne, Australia, 8/25/2017.

22. *AI & Societal Challenges* panel at the *International Joint Conference on Artificial Intelligence (IJCAI)*, Melbourne, Australia, 8/23/2017.

23. AI/Deep learning panel at the CMU Summit on US-China Innovation & Entrepreneurship, 4/15/2017.

24. AI for Cybersecurity panel. *Cyber Meets AI* conference, In-Q-Tel, Arlington, VA, 2/23/2017.

25. Recent Breakthroughs in Heads-Up No-Limit Texas Hold'em. AAAI Conference on Artificial Intelligence, 2/9/2017.

26. High Tech Panel at the CMU Summit on US-China Innovation & Entrepreneurship, 4/9/2016.

27. Invited discussion leader, Roundtable on Matching Markets and Fairness (geared toward developing a research roadmap for better and more affordable care in the EU: `www.we-do-care.eu`). At the Workshop "Towards Better and More Affordable Healthcare: Incentives, Game Theory, and Artificial Intelligence" at the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Paris, France, 5/5/2014.

28. Invited Debater, "Are search engines closing our minds?" public debate. The University of Pittsburgh's Computer Science Department partnered with the William Pitt Debating Union (WPDU) to sponsor this unique debate, scheduled as a feature event during "Computer Science Day 2013", 3/22/2013.

29. *Real-world AI work* panel, consisting of entrepreneurs and other AI business leaders, in the CMU undergraduate core AI course "15-381 Artificial Intelligence", taught by Emma Brunskill and Ariel Procaccia, 12/3/2012.

30. Panel at the *Optimisation for Multi-agent Systems workshop* at the *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, Valencia, Spain, 6/5/2012.

31. Panel on *Research issues in multi-item market design* at the INFORMS Annual Conference, Charlotte, NC, November 13–16, 2011. Other panelists: Peter Cramton, Wedad Elmaghraby, and Karla Hoffman.

32. Presentation "Computational Game Theory Methods for SoCS" in the panel on *Computational Models and Techniques for SoCS* at the *Social Computational Systems (SoCS) Conference*, University of Minnesota, Minneapolis, MN, June 9–11, 2011.

33. *How do we model opponents?* panel at the Army Research Office Workshop on Reasoning in Adversarial and Noncooperative Environments, Duke University, November 18—19, 2010.

34. Panel at the *Agent-Mediated Electronic Commerce Workshop (AMEC)* at the International Conference on Autonomous Agents and Multiagent Systems, Estoril, Portugal, May 13th, 2008.

35. Panel at the *Agent-Mediated Electronic Commerce Workshop (AMEC)* at the International Conference on Autonomous Agents and Multiagent Systems, Honolulu, HI, May 14th, 2007.

36. "What Should We Teach Students About Auctions?" panel at the *INFORMS Annual Meeting* Pittsburgh, PA, November 5–8, 2006.

37. Panel on Agent/Robot Coordination with Auctions. *AAAI workshop on Auction-Based Robot Coordination*, Boston, MA, 7/17/2006.

38. "Trading Technologies" panel at *CS50*, 50th anniversary celebration of the Computer Science Department at Carnegie Mellon University, Pittsburgh, PA, April 20, 2006.

39. "Combinatorial Auctions for Industrial Procurement" panel at the *INFORMS Annual Meeting*, joint cluster "Applications of Auction and Game Theory" and "OR Practice", San Francisco, CA, November 14, 2005.

40. "Impact for Agents" panel at the *International Conference on Autonomous Agents and Multiagent Systems*, Utrecht, Netherlands, July 28, 2005.

41. Panel at the DIMACS Workshop on Computational Issues in Auction Design, Rutgers, October 7–8, 2004.

42. At the "Innovations in Transportation" conference, organized by the Center for Transportation and Logistics, MIT, April 27-28, 2004. (Due to a time conflict, I sent another CombineNet representative to give the panel talk.) .

43. "Preparing and Interviewing for Academic Jobs" panel at the International Joint Conference on Artificial Intelligence (IJCAI) Doctoral Consortium, Acapulco, Mexico, August 10, 2003.

44. "AI Startup Companies" panel at the International Conference on Innovative Applications of Artificial Intelligence (IAAI), Edmonton, Canada, July 31, 2002.

45. B2B Electronic Negotiation panel at the AAAI workshop on Agent-Based Technologies for B2B Electronic Commerce, Edmonton, Canada, July 2002.

46. "Moving E-Commerce Research to the Real World: Key Technologies and Practical Challenges" panel at the Agent-Mediated Electronic Commerce workshop at the First International Joint Conference on Autonomous Agents and Multiagent Systems, Bologna, Italy, July 16, 2002.

47. Panel at the IJCAI Workshop on E-Business & the Intelligent Web, at the International Joint Conference on Artificial Intelligence (IJCAI), Seattle, WA, 8/5/2001.

48. Agents in E-Commerce panel at the Fifth International Conference on Autonomous Agents (AGENTS), Montreal, Canada, 5/31/2001.

49. Negotiation Possibilities in E-Commerce panel at the Negotiation: Settling Conflicts and Identifying Opportunities Workshop at the National Conference on Artificial Intelligence, Orlando, FL, July 19, 1999.

50. Trading Theory panel at the Agent-Mediated Electronic Commerce Workshop at the International Joint Conference on Artificial Intelligence, Stockholm, Sweden, July 31, 1999.

51. Agents in Electronic Commerce Panel at the Second International Conference on Autonomous Agents (AGENTS), Minneapolis, MN, May 11, 1998.

52. Electronic Trading Theory Panel at the Agent-Mediated Electronic Trading Workshop at the Second International Conference on Autonomous Agents (AGENTS), Minneapolis, MN, May 10, 1998.

53. Agent-Mediated Electronic Commerce Panel at the International Conference on Electronic Commerce (ICEC), Seoul, Korea, April 8, 1998.

INVITED PARTICIPANT (Invited talks are listed elsewhere.)

1. Week-long US Air Force Title 10 international wargame, February 2022.
2. NSF Workshop: A Conversation between Computer Science and Operations Research on Stochastic Optimization. Organized by Warren B. Powell and Satinder Singh. Rutgers University, 5/31-6/1/2012.
3. Google Faculty Summit, Googleplex, California, July 23–25, 2008.
4. Northwestern University Games and Theoretical Economics workshop (10 of the leading economists and computer scientists in game theory were invited), Evanston, IL, October 24–29, 2005.
5. Northwestern Summer Micro-Economics workshop, Evanston, IL, July 22-25, 1999.
6. NSF Workshop on Research Priorities in Electronic Commerce, Austin, TX, September 10-12, 1998.
7. International Workshop on Multiagent Systems. MIT, October 12–14, 1997.
8. Second International Workshop on Mobile Agents. Dartmouth College, Hanover, NH, September 19–20, 1997.
9. DARPA Young Investigator Workshop, Providence, RI, July 27–28, 1997. (The 20 participants were selected from over 100 researchers nominated by senior members of the AI community.)
10. Decentralization Conference (NSF sponsored), Penn State University, Department of Economics, May 9–11, 1997.
11. NSF ITO (Information Technology and Organizations) Grantee Workshop, April, 19–20, 1997.

OTHER EVIDENCE OF EXTERNAL REPUTATION

Citation impact

- h-index 100 (Google Scholar), 12/2025
- #9 most influential person in AI over all time (according to aminer.org 12/20/2016 and 1/15/2018).
- #1 most cited person in artificial intelligence over the last 10 years (according to Microsoft Academic Search 4/2/2010).
- #15 in AI of all time according to ScholarGPS 5/6/2025.
- 85th among all computer scientists in the world over all time (www.arnetminer.org/expertrank/list/hindex on 7/13/2011).
- 3rd in Multiagent Systems / Agent Organization in the world over all time (arnetminer 11/2/2012).
- 4th in Mechanism Design / Learning Stochastic Finite Automata in the world over all time (arnetminer 11/2/2012).
- 8th in Machine Learning in the world over all time (arnetminer 11/2/2012).
- 8th in Learning Search Control Rules / Explanation-Based Approach in the world over all time (arnetminer 11/2/2012).
- Ranked at position 379 worldwide and 250 in the United States in Guide2Research (which ranks in the arena of Computer Science and Electronics) in 2019.

Selected media articles about Prof. Sandholm's work

- 3-hour podcast on Finland's most popular podcast, Sijoituskäst, November 2025. In Finnish. 121,000 views in the first two months.
- "Was erfolgreiche Pokerspieler auszeichnet", *Der Spiegel*, 9/4/2020.
- Our AI *Pluribus* beating top human professionals at the most popular poker game in the world (multi-player no-limit Texas hold'em in 2019 was covered in Wall Street Journal (front page), Nature, Forbes (two articles), New York Times, NPR, Wired, Wired UK, Scientific American, Der Spiegel, Bloomberg, Financial Times, Business Insider, Gizmodo, Science Daily, International Business Times, La Repubblica, Marketplace, Smithsonian Magazine, HPCwire, Ars Technica, Voxel, Singularity Hub, Investment Magazine, Synced, Daily Business Buzz, Technology Networks, AZ Big Media, Infonews, The Print, PokerNews (multiple articles), InfoQ, Pokerfuse, Play Pennsylvania, TechQuila, Gambling News, Tight Poker, NJ Online Gambling, Analytics Insight,

The Fan Carpet, Beat The Fish, OnlinePokerReport, LegalUSPokerSites, Pittsburgh Post-Gazette, and dozens of other outlets.

- Starred in the video by Trailblazers: "AI: Hype vs. Reality", S1:EP5, 7/16/2019.
- "A daughters gift to her mother saves two lives". *The Washington Post*, 5/12/2019. This article describes how Prof. Sandholm's invention of multi-organ exchange, and the paper he wrote on it with his student John Dickerson, led to the first multi-organ exchange.
- "My liver, your kidney: the world's first non-identical organ swap", *New Scientist*, 5/9/2019. Article on the first liver-kidney swap that happened based on Prof. Sandholm's idea of multi-organ exchange.
- A Poker-Playing Robot Goes to Work for the Pentagon. *Wired*, 1/16/2019.
- "Hold on...a Computer Can Play Texas Hold'Em?". In the *BREAKING NEW GROUND: Computational Science at the Forefront of Discovery* publication by the Coalition for Academic Scientific Computation, 2019.
- Starred in the movie "AI vs The Human Brain: The Final Showdown", 53 minutes, available on Amazon Prime, 2018.
- "No Telling: Bridges Plays Poker". Article about our work on poker AIs in the Extreme Science and Engineering Discovery Environment (XSEDE) Highlights, 6th Edition, 2018.
- "Safe and Nested Subgame Solving for Imperfect-Information Games", *This Week in Machine Learning & AI (TWiML)* podcast was devoted to our paper and did an extensive interview of Prof. Sandholm, 1/22–1/28/2018.
- "Inner workings of victorious AI revealed by researchers: Libratus AI defeated top pros in 20 days of poker play", Science News, 12/18/2017.
- The "Brains vs AI: Upping the Ante" poker match that I organized in heads-up no-limit Texas Hold'em in January 2017, and our associated poker-playing program Libratus, was covered in Fortune, VICE News (including TV episode), La Vanguardia (leading Spanish TV), ABC (leading Spanish TV), Discovery Channel Canada (TV), Bloomberg Businessweek, Washington Post (2 articles), Wall Street Journal (3 articles), Financial Times, Time, Der Spiegel, BBC, MIT Technology Review (2 articles), Wired (4 articles plus mentioning Libratus as one of the notable strides in AI in 2017 in another article), IEEE Spectrum (3 articles), Engadget, PBS Newshour, The Economist, Reuters (New York Times), The Guardian (2 articles), DailyMail (UK), DNA (India), The Verge (2 articles), The Register, Reuters Science News, Chicago Tribune, fivethirtyeight, Business Insider, ExtremeTech, New Scientist, Mashable, Science News, Fox News Tech, Repubblica, el País, Voice of America, ABC.Net (Australia), Dagens Nyheter (Sweden), Vice Sports, Helsingin Sanomat (2 articles, Finland), Los Angeles Times, La Stampa (Italy), The Stack, Poker Strategy, Deccan Chronicle (India), Data Center Knowledge,

IOL (South Africa), Yibada (China), XSEDE, hpcwire, ars technica, gizmodo, circa, Card Player (4 articles), Quartz, Star Tribune (Minneapolis), KDKA (TV), Channel 2 Israeli News, Pokernews, Poker News Daily, highstakesdb, Gaming Today, LiveScience, Yahoo (multiple articles), Silicon Republic, EconoTimes, The Indian Express (India), calvinayre.com, reddit, RTT News, Top500, TechExec, CBS Pittsburgh, South China Morning Post, ZDNet, Consumerist, Yahoo!Finance, Data Science Central, Pittsburgh Post Gazette (multiple articles), Pittsburgh Tribune Review (multiple articles), NEXT Pittsburgh, The Incline, Adrenaline Boost, Esoteric News, Hackaday, Pittsburgh Supercomputing Center Science Highlights, New Equipment Digest, and hundreds of other outlets around the world. This was also covered in a video within the annual talk of the CEO of Hewlett Packard, Meg Whitman, at the annual HP Enterprise conference 6/6/2017. To quote an article in Slate: "In essence, Libratus highlighted the folly in assuming that humans have collectively mastered anything."

- The AI vs. humans exhibition that I organized in heads-up no-limit Texas Hold'em in Haikou, China in April 2017 between our Lengpudashi AI and six Chinese poker pros, including China's only World Series of Poker bracelet winner, received over 50 million views. I gave a talk to over 500,000 live streaming viewers there. The match was also covered extensively in the Chinese news, and also in Bloomberg, MIT Technology Review, Engadget, Pittsburgh Tribune Review, Poker News, Poker Sites, Indian Express, Live Mint, Card Player, Vocativ, PokerTube, CalvinAyre, Cards Chat, etc.

- My keynote at *JD Discovery* in Beijing in Fall 2017 attracted 860,000 live viewers on JD.com alone, and probably around 3,000,000 live viewers overall.

- The Heinz Nixdorf Museums Forum, the world's biggest computer museum, in Paderborn, Germany, included a video about Libratus in the permanent exhibit, 2018.

- Filmed for French documentary on AI, Spring 2017 (Docland Yard Production).

- Filmed by famed documentarian Jasper Koning for his Dutch documentary *Robo Sapiens* on the state and future of AI, Spring 2017 (VPRO Broadcast).

- Video "This Poker-Playing AI Could Change the World" by *Great Big Story* on Libratus and our Brains vs. AI event, 11/6/2017. It received millions of views within weeks.

- Libratus was covered in the AI movie "Do You Trust This Computer", 2018.

- Libratus was covered by WHYY, the Philadelphia NPR affiliate.

- Libratus was featured via two articles in the short collection "Year 2017 in Review" by Carnegie Mellon University.

- Inside HPC article "AI Systems Designed to Learn in a Limited Information Environment", 12/13/2017.

- The "Brains vs AI" poker match that I organized in heads-up no-limit Texas Hold'em in April-May 2015, and our associated poker-playing program Claudico, was covered on the BBC front page (and #1 on BBC World News), PBS, NBC, CBS, Der Spiegel, New York Times, LA Times, IEEE Spectrum (3 articles), MSN.com, Wired (web version), HPCWire, ABC News, Christian Science Monitor, Daily Mail, Fox Business, Le Figaro, SFGate, Live Science, New Scientist (twice), Science Times, Motherboard, reddit, Tech Times, Bluff.com, Pokernews, highstakesdb, Roboticstrends, Scientific Computing, Engineering, Modern Notion, and hundreds of other news outlets. Over 6,000,000 re-tweets. The full event was broadcast and stored on five streams on Twitch.

- Interviewed on *Voice of America*, China, 2020.

- My work on poker and on kidney exchange were the #1 and #2 applications covered in the PBS documentary on AI, part 3, May 2015.

- 3-minute video on the National Science Foundation front page about me talking about our new advertising optimization technology and my new startup, Optimized Markets, Inc, 5/21/2013.

- The book *"Automate This: How Algorithms Came to Rule Our World"* (August 2012), by Christopher Steiner, devotes six pages to Prof. Sandholm and his work.

- How Supercomputers will transform the way we learn poker. Cover story in *CardPlayer* magazine, 28(7), 40–43, April 1st, 2015.

- Poker-Playing AIs Today, Skynet Tomorrow. IEEE Spectrum 2/25/2015.

- My comments on solving imperfect-information games from my Perspective in *Science* (Jan 2015) were covered in New Scientist, Popular Mechanics, Christian Science Monitor, etc.

- Poker Bot: 'A Nuclear Weapon For Poker' Part Two: Professor Tuomas Sandholm Discusses His Heads-Up No-Limit Hold'em Bot 'Tartanian7' And What It Means For The Future Of Poker. Continuation article on cardplayer.com, 9/25/2014.

- "Championship Poker Bot: 'A Nuclear Weapon For Poker': Professor Tuomas Sandholm Discusses His Heads-Up No-Limit Hold'em Bot 'Tartanian7' And What It Means For The Future Of Poker". Feature story (i.e., lead article) on cardplayer.com, 9/24/2014.

- After Google's AlphaGo program beats Go champion, what's next for AI? LA Times, 3/11/2016.

- "Humans Are Superfluous Ready, Set: A.I. Challenges Human Champion at Worlds Hardest Game". Yahoo! TECH, 2/19/2016.

- "Poker bots invade the virtual casino". Interview on *American Public Media Marketplace (aka NPR Marketplace)* national radio show, 4/13/2011.

- My work was mentioned and I was cited in "Poker Bots Invade Online Gambling", *New York Times*, Science section, 3/13/2011.
- "Giant of Artificial Intelligence" multi-page article in the magazine *Talouselämä* (Finnish analog to Businessweek), June, 2008.
- Poker Night in America (TV show), Season 4, Episodes 18-20, CBS Sports Network, October 10-24, 2016.
- "Computer bluffen nicht", Frankfurter Allgemeine Sonntagszeitung, Wissenschaft (Science) section, September 18, 2016.
- "Carnegie Mellon Baby Tartanian8 Pokerbot Sweeps Annual Competition", UCSD News Center, August 31, 2016.
- "Heads-Up Bots Will Be Stronger Than Humans; No-Limit Hold'em May Never Be Solved", Matthew Pitt, PokerNews.com, March 16, 2016.
- "Artificial Intelligence Bot vs. The Poker Pros", Los Angeles Times, May 21, 2015.
- "Human vs machine as top poker pros take on AI", New Scientist, May 6, 2015.
- "Research on poker a good deal for airport security", *Pittsburgh Post Gazette* front page, 8/2/2010. The article also appeared in *Homeland Security Today, Airport Business, ACM Technews, scrippsnews, IndependentMail, indiatimes, Cake Poker, Texas Holdem Training, Titan Poker*, and many other outlets.
- Article "Kidney Exchange" on our kidney exchange work and me in *National Science Foundation CS Bits & Bytes*, Volume 1, Issue 6, 2/27/2012.
- "Kidney Exchange Algorithm Launches Chain of 10 Transplants". COMPUTING RESEARCH HIGHLIGHT OF THE WEEK [July 17–24, 2009]. Computing Research Consortium.
- *BusinessWeek*, Developments to Watch section. 9/10/2007. MEDICAL MATH: Matching More Organs To More Patients.
- Our kidney exchange work was covered on NBC Nightly News with Brian Williams, 9/17/2007.
- *New York Times*. 7/26/2007.
- *Der Spiegel*. Glück aus Berechnung. Poker, das alte Zockerspiel, kommt zu neuem Ansehen — Computerforscher, Schachgrossmeister und Mathematiker entdecken seine strategische Reize. 7/17/2006.
- The quest for artificial intelligence that can outsmart hackers. CBS NEWS, 6/20/2016.
- FUTUREMATCH: Enabling Better Organ Exchange Programs. Pittsburgh Supercomputing Center biannual report, Spring 2015, p. 8–9.

- *Computerworld*. AI Boosting Smarts in Online Auctions. 11/24/2003.
- *BusinessWeek*, Developments to Watch section. 5/17/99: "Cyberauctions You Can Finesse". (Article on my combinatorial auctions).
- *Mashable* published an article on kidney exchange and highlighted our work: "Big Data's Effect on Organ Transplant Wait Lists", 7/23/2014.
- 1-page article on my electronic commerce server, *eMediator*, in *Tages Anzeiger*, Computer section, Switzerland. Page 57. Journalist: Dani Metzger. 7/5/99. "Feilschen im globalen Basar".
- Article in *Science Daily*. 4/27/99: "Electronic Auction House First To Offer Mobile Agent".
- Interviewed for and covered in the *Financial Times* (London) 7/22/1998: "Cooling off for the hot bots".
- Interviewed for and cited in the *New York Times* 2/10/1997: "Intelligent Software Finding Niche".
- Interviewed for and spoke on the *Science Update* US national radio program regarding electronic commerce systems consisting of multiple self-interested software agents. Official broadcast date was 7/18/97, but actual broadcast dates vary station to station. Also broadcast on Mutual Broadcasting's *America in the Morning*.
- "Algorithm Matches Kidneys More Efficiently", *International Business Times*, 11/18/2010.
- "Algorithm could lead to many more kidney transplants", *Marketplace Tech Report*, which airs on *NPR* stations, interviewed me on kidney exchange, and airings started 11/24/2010.
- "Stacked Deck: Robots beat the odds in online poker", *New York Times News Service*. Appeared, e.g., in *The Blade*. 3/19/2011.
- *TwoPlusTwo Magazine* published an entire article "Commentary on Computing an Approximate Jam/Fold Equilibrium for 3-player No-Limit Texas Hold'em Tournaments" about our AAMAS-08 paper "Computing an Approximate Jam/Fold Equilibrium for 3-player No-Limit Texas Hold'em Tournaments" in their May 2011 issue.
- Faculty Earn NSF Grants to Accelerate Innovation, 8.5 x 11 News, 9/22/2011.
- Industrial Engineering and Management Science Guild alumni magazine spotlight, Helsinki University of Technology, Finland, 2/2011.
- "His program could speed U.S. kidney transplants", *Pittsburgh Post Gazette* front page, 12/18/2010.
- "A Match for Life", Dr. Dobbs, 11/23/2010.

- "System gives transplants a math boost: CMU develops algorithm to match donor organs, potential recipients", *Pittsburgh Tribune Review*, 11/22/2010.
- "Its a match: Algorithm finds kidneys", Futurity.org (a science news website run by the AAU), 11/18/2010.
- CMU home page story on our kidney exchange work, 11/17/2010.
- "Artificial intelligence learns from poker bluff: Carnegie Mellon team puts its smarts to the test during victorious run in tournament", *Pittsburgh Tribune Review*, 8/4/2010.
- "Winning Hand", *The Link*, Spring 2009.
- Feature article in *International Science Grid this Week*: "Poker, parallelism and payoff", 4/29/2009.
- "Scientists create algorithm to help kidney transplants", *The Tartan*, 3/30/2009.
- "'Altruistic' kidney donors starting chain-reaction transplants", Pittsburgh Post Gazette, 3/22/2009.
- "Matchmaking for Kidneys" in *SIAM (Society for Industrial and Applied Mathematics) News*, 12/21/2008.
- Carnegie Mellon News Headlines article: "Sandholm Among The 73 Biggest Brains in Business". Summer 2008.
- "Shared Memory Poker". Pittsburgh Supercomputing Center, Projects in Scientific Computing, 2008
- *Carnegie Mellon Today* (CMU's monthly magazine). January 2008. Cover story. Pay It Forward: Tuomas Sandholm Rewrites Organ Donation.
- *Discovery News* (Discovery Channel web site). Math Matches Kidney Donors to Patients. 6/18/2007.
- *medGadget: internet journal of emerging medical technologies.* How to Barter a Kidney. 6/14/2007.
- On *KQV* radio show live regarding our kidney exchange algorithm. 6/12/2007.
- *National Science Foundation (NSF) News From the Field:* Carnegie Mellon Scientists Devise Method to Increase Kidney Transplants. 6/11/2007.
- *Pittsburgh Tribune-Review:* CMU scientists use math to save lives. 6/11/2007.
- *Pittsburgh Post Gazette.* Paired donations give organ transplants a brighter future. 5/9/2007.
- *ACM TechNews.* The Thinkers: CMU Prof Using Game Theory to Match Kidneys. 5/7/2007.

- *Pittsburgh Post Gazette.* (front page) The Thinkers: CMU Prof Using Game Theory to Match Kidneys. 5/7/2007.
- *PokerMag.* Robot Poker Player Ups the Ante. 7/21/2006.
- *The Mercury News.* Computers find poker, like real life, a tougher challenge than chess. 7/18/2006.
- *ACM TechNews.* Covered one of our early pokerbots, *GS2*. 7/2006.
- *Pittsburgh Post Gazette.* Covered one of our early pokerbots, *GS2*. 7/2006.
- *Dr. Dobbs.* Computer Poker: AI Contest is a Big Deal. 7/7/2006.
- *TEQ Magazine*. Decisions, decisions, decisions; Tuomas Sandholm and CombineNet lead the way in expressive competition through combinatorial optimization. July/August issue, 2003.
- *Pittsburgh Post Gazette*. Europe slow in stemming 'brain drain' to America. Pittsburgh 'brain gain' section. 10/20/2003.
- *Pittsburgh Post Gazette*. Risk Diary: How one man copes with growth. 9/11/2003.
- *Pittsburgh Post Gazette*. The man behind the curtain: CMU professor has developed programs adept at picking out the best rules to govern the decision-making process. 8/11/2003.
- *The Tartan:* Sandholm will speak on CS, Game Theory. 9/15/2003.
- *Pittsburgh Tribune-Review:* Newsmaker: Tuomas Sandholm. 8/19/2003.
- *Pittsburgh Post Gazette:* CMU Professor Wins Award for Program that Aids Decision-Making Process. 8/11/2003.
- *Pittsburgh Tribune-Review:* CombineNet Founder Honored. 3/6/2003.
- *Carnegie Mellon News.* CombineNet Founder Honored. Computer Science Professor Wins Prestigious AI Award. September 2003.
- Article in *The Edmonton Sun*, 8/2/2001: "Coming soon: computers that vote". Inside story by Doug Beazley.
- Article in *The Toronto Star*, 8/7/2001: "Soon: Artificial intelligence at your service. Future programs, machines may do deals for you".
- My auction server covered in *St. Louis Business Journal*, In the Spotlight section, 5/17/99.

Selected media appearances of Prof. Sandholm's second company, CombineNet, Inc.

- "For an Online Marketplace, Its Better Late Than Never", *New York Times*, 11/20/2010.
- *Forbes.com.* 8/10/2003.
- *CIO Magazine:* How to Know if E-Procurement Is Right for You. 6/15/2003.
- *Smart Business Magazine:* Doing Their Bidding: Giving Bidders and Buyers More Options. October 2003.
- *The Daily Deal* wrote an article on CombineNet 5/30/2002.
- *USA Today:* CombineNet Announces Renewal of Software License Agreement with PPG Industries. 7/10/2003.
- Listed by The Standard: Intelligence for the Internet Economy 3/2001.
- 11-minute interview on *Wallstreet.com*, 6/2001.
- "The Bid, Evaluation, and Optimization Solution (BEOS)", US Department of Agriculture (USDA) *Web Based Supply Chain Management Update*, September 2008.
- *Supply & Demand Chain Executive.* New Tool for Optimized Sourcing of North American Truckload Transportation. November 2005.
- *Supply Chain Systems Magazine.* Understanding Optimization. September 2005.
- *CPO Agenda.* Beyond reverse auctions. Spring 2005.
- *Modern Plastics.* How P&G Buys Plastics. December 2004.
- *Purchasing Magazine.* P&G Boosts Leverage. 11/4/2004.
- *GlobalCPO.com.* Siemens builds optimization capabilities.
- *B2B Market Alert.* Pagonis named to CombineNet post. Sept 2–9, 2004.
- *Supplier Selection & Management Report.* Siemens' COP Process Unravels Complex Bids Quickly, Accurately. July 2004.
- *Purchasing Magazine.* Freight buyers plug in from different angles. 6/17/2004.
- *Purchasing Magazine.* Decision Support. The power to ask "What if?". 4/1/2004.
- *Pittsburgh Post Gazette.* Promising Software Venture Gets $12M. 2/21/2004.
- *Purchasing Magazine.* Shippers Get Strategic in Comparing Performance. 2/5/2004.
- *Inbound Logistics.* Moving Beyond Reverse Auctions: Using Combinatorial Optimization, Dupont Finds Further Ways to Save on Transportation. 11/2003.

- *Supplier Selection and Management Report:* Purchasing Leadership: "Expressive" Online Bidding Cuts Ocean Frewight Costs at Bayer. June 2003.
- *Traffic World:* Freight on the Block. 5/12/2003.
- *eMarketect Magazine:* Case Study: CombineNet Streamlines Sea freight Allocations for Bayer Corporation. 4/22/2003.
- *iSource:* Bayer Taps CombineNet. 4/11/2003.
- *Yahoo! Finance*: CombineNet Founder and Chief Technology Officer Receives Prestigious Awards for Scientific Achievement. 3/5/2003.
- *USA Today, Money section*: CombineNet Hires Global Business Expert in Supply Chain, Procurement Management. 2/18/2003.
- *Pittsburgh Business Times*: CombineNet opens an office in London. 1/16/2003.
- *"Sunday Business Page" TV show with Bill Flanagan, KDKA-TV.* 1/5/2003.
- *Pittsburgh Tribune-Review*: The future's looking bright. 11/20/2002.
- *Pittsburgh Business Times*: P&G deal fuels growth, move at CombineNet. 11/15/2002.
- *line56.com*, E-Business News: CombineNet Lands Procter & Gamble. 11/8/2002.
- *bizjournals.com* (also *Pittsburgh Post Gazette*): CombineNet wins federal grant, 6/12/2002.
- *VCBuzz.com*: Analysis Software Firm CombineNet Gets $6 Million Second Round. 6/3/2002.
- *Private Equity Week* wrote an article on CombineNet 5/31/2002.
- *eChemmerce (Chemical, Plastics & Energy E-Commerce)*: PPG Licenses ClearBox. 2/14/2002.
- Pittsburgh Business Times. Page 3: half-page article with a picture: "Better Mousetrap: CombineNet software lets bidders pick and choose". Page 63: "CombineNet: As of yet, there's no competition". January 11–17, 2002.
- Half-page article on the front page of the business section (continued later in the paper) of the *Pittsburgh Post-Gazette*: Making a home in Pittsburgh: California software startup CombineNet moves to Oakland. 3/9/2001. By Antonio Gilb, Post-Gazette Staff Writer.
- Business News Briefs of the *Pittsburgh Post-Gazette*: California software concern finds home in Oakland. Top left of the business section. 3/7/2001.

Selected media appearances of Prof. Sandholm's first company, BusinessBots, Inc.

- 1-page article on BusinessBots in *Time*, Business section. 7/12/99: "The Next E-volution: BusinessBots could transform corporate commerce, just as the web transformed consumer shopping".
- *Time*, Select Issue, 9/6/99.
- *The Forrester Report*, April 2000.
- *CBS Marketwatch*, 8/2/99: "Robots in cyberspace".
- *PC Welt*, July, 1999.
- *Industry Standard*, 10/12/98: "Four Secret Net Companies You Should Know".
- *Red Herring magazine*, 2/98.
- *InformationWeek Online*, 8/2/99: "Java Application Builds Vertical E-Markets".
- *Release 1.0*, 10/97: "Evolving Commerce".

EXTERNAL PROFESSIONAL ACTIVITIES

Associate Editor of journals

- ACM Transactions on Economics and Computation (Associate Editor on the founding editorial board), 2011–.
- Artificial Intelligence (AIJ), 1/2011–12/2014.
- Autonomous Agents and Multi-Agent Systems (AAMAS), 5/1999-

Editorial board member for journals

- Artificial Intelligence (AIJ), 1/2007–12/2010.
- Journal of Artificial Intelligence Research (JAIR), 1/1999-3/2002
- Knowledge, Rationality and Action. (New section of the journal *Synthese*. Appears as two separate issues of that journal per year starting 2004.) Founding editorial board member, 2003–2007.

Chair

- SIGecom Mid-Career Award Committee, 2025–2026 cycle.
- Organizer of STOC workshop on New Frontiers of Automated Mechanism Design for Pricing and Auctions (together with Nina Balcan and Ellen Vitercik), 2019.
- Test of Time Award committee, ACM Conference on Economics and Computation (EC), 2018.
- Program Co-Chair (with John Riedl), ACM Conference on Electronic Commerce (EC), 2008.
- Program Co-Chair (with Makoto Yokoo), International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), 2003.
- Associate Chair, National Conference on Artificial Intelligence (AAAI), 2013.
- Area Chair, National Conference on Artificial Intelligence (AAAI), 2011.
- Area Chair (Economics) of the International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2009.
- Organizer (with Ulle Endriss, Jerome Lang, and Francesca Rossi). Dagstuhl Seminar 07431: Computational Issues in Social Choice. Schloss Dagstuhl, Germany, October 21–26, 2007.

- Organizer (with Michael Rothkopf and Eric Rasmusen). DIMACS conference on Auctions with Transaction Costs, March 22–23, 2007.
- Organizer (with Avrim Blum). Market Design Workshop. Hosted by my NSF ITR team. Carnegie Mellon University, May 8–9, 2006.
- Organizer (with Rudolf Müller and Daniel Lehmann). Dagstuhl Seminar on Computing and Markets. Schloss Dagstuhl, Germany, January 3–7, 2005.
- Organizer (with R. Ravi, C. Parlour, and A. Blum). Market Design workshop. Hosted jointly by my NSF ITR team and the Aladdin team. Carnegie Mellon University, October 28–29, 2004. 55 participants.
- Organizer and Chair. Agents and Ecommerce panel at the *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Melbourne, Australia, 7/16/2003.
- Organizer (with Rudolf Müller, Rakesh Vohra, and Daniel Lehmann). Dagstuhl Seminar on Electronic Market Design. Schloss Dagstuhl, Germany, June 9–14, 2002. 60 participants from around the world.
- Area chair, responsible for papers submitted in the area of Computational Market Systems. Third International Conference on Autonomous Agents (AGENTS), Seattle WA, 1999.
- Break-out group on Computer & Networking Technologies at the NSF Workshop on Research Priorities in Electronic Commerce, Austin, TX, September 10-12, 1998.
- Co-chair of the *Market-based Systems* working group at the International Workshop on Multi-Agent Systems (IWMAS), MIT, October 12-14, 1997.
- AI and Logistics Workshop, Finnish Artificial Intelligence Conference, (Organizer, Chair, and Referee), Helsinki, Finland, 1992.

Associate editor

- Management Science. Special Issue on Electronic Markets. 2002–2003.
- Special issues of *Journal of Economic Dynamics and Control (JEDC)* and *Computational Economics (CE)* on Agent-Based Computational Economics, 1999. (Also acted as a reviewer.)

Executive and advisory committee memberships

- Operations Research and Artificial Intelligence Program (ORAI) Advisory Board, University of Southern California (USC), 2025–

- Founding Member, Center for a New American Security (CNAS) Task Force on Artificial Intelligence and National Security, 2018–.
- Founding Advisory Board Member, *Auctions and Market Design* Section of INFORMS, 2017–.
- SIGecom Mid-Career Award Committee, 2024 (and chair in 2025).
- Board Member, *Auctions and Market Design* Section of INFORMS, 2020–2023.
- Advisory Board member, DIMACS Special Focus on Learning and Games, 2021–.
- "Highlights Beyond EC Committee" for *ACM Conference on Economics and Computation (EC)*, 2022. The committee identifies excellent papers that have recently been published in journals or conferences other than EC (or mature working papers), and that would be of great interest to the EC community.
- Review process redesign committee for *Management Science*, 2019–2020.
- Test of Time Award committee, ACM Conference on Economics and Computation (EC), 2016-18.
- Search committee member for finding and recruiting next Editors-in-Chief for *ACM Transactions on Economics and Computation (TEAC)*, 2016.
- *Councilor* (elected position), *Executive Council of the Association for the Advancement of Artificial Intelligence (AAAI)*, 2008–2011.
- Association for the Advancement of Artificial Intelligence (AAAI) *Awards Committee*, 2/2010–8/2011.
- Association for the Advancement of Artificial Intelligence (AAAI) *Finance Committee*, 7/2010–2011.
- Association for the Advancement of Artificial Intelligence (AAAI) *Membership Committee*, 2008–2010.
- International Foundation for Autonomous Agents and Multiagent Systems (IFAAMAS), Board of Directors member (elected), 2006–2012.
- IFAAMAS Finance Subcommittee, 2009–13.
- ACM SIGART Autonomous Agents Research Award selection committee member, 2011, 2012.
- Technical Advisor to the *United Network for Organ Sharing (UNOS)* (i.e., the body that handles all transplantation in the US), 2011–.
- UNOS *Kidney Paired Donation (KPD) Program Work Group*, (founding member, 2009–2020). (Designing nationwide kidney exchange. Pilot program started running in October 2010.)

- UNOS *KPD Program Work Group*, *Donor Chains Subcommittee*, (founding member, 2010–2020).
- UNOS *KPD Program Work Group*, *Deceased Donor Chains Work Group*, (founding member, 2016–2020).
- UNOS/OPTN KPD Strategic Planning Team (founding member, 7/2011–2020).
- UNOS KPD Optimization Algorithm and Design Subcommittee (founding member 2/2013–2020).
- Member, Allocation Policies and Algorithms Work Group, Consensus Conference on Kidney Paired Donation, co-sponsored by the American Society of Transplantation and the American Society of Transplant Surgeons, 2012.
- Representative of the Allocation Policies and Algorithms Work Group to the Implementation Work Group, 2012.
- Ad hoc Advisor for the *Alliance for Paired Donation* (one of the two largest regional kidney exchanges in the US) 2006–2008.
- Ad hoc Advisor for the *Paired Donation Network* (one of the two largest regional kidney exchanges in the US) 2008–2011.
- Olympus Advisory Cabinet, 2007–. Project Olympus is a new initiative designed to create and sustain Next Generation Computing innovation for Western Pennsylvania.
- Carnegie Science Center Awards for Excellence, Information Technology category, award selection committee, 11/2004–7/2010.
- Steering Committee Member, AAAI Annual Poker Competition, 2009–2019.
- Judge in the Open Innovation Competition, organized by Project Olympus and sponsored by Foundation Capital, March 2010. Theme of the competition was ideas/technologies as the basis for startups for early detection of trends in social media.
- Best paper award selection committee, ACM Conference on Electronic Commerce (EC), 2010.
- International Foundation for Multiagent System (IFMAS), Board of Directors member (elected), 2004–2006.
- Executive Committee, International Joint Conference on Artificial Intelligence (IJCAI), 2004–2006.
- Advisory Committee, International Joint Conference on Artificial Intelligence (IJCAI-05), Edinburgh, UK, 7/31/05–8/5/05.

Senior program committee member

- International Joint Conference on Artificial Intelligence (IJCAI) - European Conference on Artificial Intelligence (ECAI), 2026.
- ACM Conference on Economics and Computation (EC), 2014, 2015, 2018.

  (EC changed its name from "ACM Conference on Electronic Commerce" to "ACM Conference on Economics and Computation" in 2014.)
- ACM Conference on Electronic Commerce (EC), 2012.
- International Joint Conference on Artificial Intelligence (IJCAI), 2009, 2011, 2013, 2015, 2016, 2018.
- National Conference on Artificial Intelligence (AAAI), 2002, 2004, 2010, 2012.
- International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), 2002, 2007, 2009, 2010, 2012, 2013, 2016.

  (AAMAS-02 was the inaugural joint conference of the International Conference on Multi-Agent Systems (ICMAS), International Conference on Autonomous Agents (AGENTS), and the workshop on Agent Theories, Architectures, and Languages (ATAL).)
- International Conference on Machine Learning (ICML), 2007.

Program committee member

- The Econometric Society Interdisciplinary Frontiers (ESIF) conference on Economics and AI+ML, 2026.
- The Econometric Society Interdisciplinary Frontiers (ESIF) conference on Economics and AI+ML, 2024.
- International Joint Conference on Artificial Intelligence (IJCAI), 2003, 2023.
- Second World Congress of the Game Theory Society (GAMES), 2004. One of five program committee members.
- Informs Optimization Society conference (IOS), 2016.
- National Conference on Artificial Intelligence (AAAI), 1996, 1997, 1998, 1999, 2000, 2005, 2007, 2027.
- ACM Conference on Electronic Commerce (EC), 1999 (inaugural year), 2003, 2006, 2011.
- International Conference on Multi-Agent Systems (ICMAS), 1998. (This conference was merged with two others to form the AAMAS conference starting in 2002.)

- International Conference on Uncertainty in Artificial Intelligence (UAI), 2004.
- International Conference on Autonomous Agents (AGENTS), 1997 (inaugural year), 1998. (This conference was merged with two others to form the AAMAS conference starting in 2002.)
- International Conference on Integration of Artificial Intelligence and Operations Research Techniques in Constraint Programming for Combinatorial Optimization Problems (CPAIOR), 2009, 2013.
- Conference on Theoretical Aspects of Knowledge and Rationality (TARK), 2001, 2005.
- International Conference on Distributed Computing Systems (ICDCS), 1998.
- International Symposium on Algorithmic Game Theory (SAGT), 2009.
- AAAI Workshop on Computer Poker and Imperfect Information Games, 2016.
- International Workshop on Computational Social Choice (COMSOC), 2012.
- Ad Auctions Workshop (used to be called the Sponsored Search Workshop 2005–2007), 2007, 2011.
- AAAI Spring Symposium on Game Theory for Security, Sustainability and Health, 2012.
- Workshop on Preference Handling for Artificial Intelligence, 2007.
- Agent-Mediated Electronic Commerce Workshop (AMEC), 1999, 2002.
- Workshop on E-Business and the Intelligent Web, 2001.
- Workshop on Negotiation: Settling Conflicts and Identifying Opportunities, 1999.
- Workshop on Decision Theoretic and Game Theoretic Agents, 1999, 2000.
- Workshop on Agent-Mediated Electronic Trading, 1998.
- Workshop on Artificial Societies and Computational Markets, 1998.
- International Workshop on Cooperative Information Agents (CIA), 1997, 1998.
- NSF electronic commerce initiative planning ad hoc committee, 1997.
- Scandinavian Conference on Artificial Intelligence (SCAI), 1997.

Organizing committee member

- Artificial Intelligence and Marketing Science workshop at the AAAI Conference on Artificial Intelligence (AAAI), New Orleans, LA, February 2nd, 2018.

- NSF ITR team workshop on Foundations of Electronic Marketplaces: Game Theory, Algorithms, and System, University of California, Santa Barbara, June 5–6, 2003.
- NSF ITR team workshop on Foundations of Electronic Marketplaces: Game Theory, Algorithms, and System, Northwestern University, MEDS, August 3–5, 2002.
- Infonomics Workshop on Electronic Market Design, Maastricht, The Netherlands, July, 11-13, 2001. (Program committee and organizing committee member.)
- AAAI Spring Symposium: Satisficing Models, Stanford, CA, March 1998.
- NSF workshop on Electronic Commerce (Strategic Funding Directions), University of Texas, Austin. Invited organizing committee member, May 1998.

Advising the US government (only selected entries are listed)

- Advised and presented to Air Force Futures, Pentagon, with weekly virtual meeting and many in-person meetings, 2018–2022.
- Advised and presented to the Chairman of the Joint Chiefs of Staff General Joseph F. Dunford, Jr., and the Joint Chiefs of Staff, 7/30/2018.
- Advised and presented to the Chief of Naval Operations (CNO) Admiral John M. Richardson, 4/5/2018.
- Advised and presented to the United States Deputy Secretary of Defense Patrick M. Shanahan and DoD CIO Dana Deasy, 5/21/2018.
- Advised and presented to The Principal Deputy Director of National Intelligence Sue Gordon, a primary advisor to the Secretary of Defense on intelligence issues and strategies, 1/12/2018.
- Advised and presented to the Defense Advanced Research Projects Agency (DARPA) Director Dr. Steven H. Walker, 9/27/2018.
- Advised and presented to the Central Intelligence Agency (CIA), 10/29/2018.
- Multiple days in the Pentagon with officers from the Joint Chiefs of Staff and the Air Force throughout 2018.

Referee

External reviews and funding agencies

- Evaluator of candidates for a professorship in "Internet and networks in ubiquitous systems", Computer Science and Engineering Laboratory in the Department of Electrical and Information Engineering of the Faculty of Technology in the University of Oulu, Finland, 2010–2011.

- Oulu Infotech (a large industry-university research consortium) 4-year evaluation, Finland, Fall 2009.
- National Science Foundation (NSF), Operations Engineering program.
- Netherlands Organisation for Scientific Research, 2012.
- International Joint Conference on Artificial Intelligence (IJCAI) workshop proposals, 2011.
- Army Research Office MURI.
- National Science Foundation (NSF), Division of Computing and Communication Foundations, Interface between Computer Science and Economics & Social Sciences (ICES).
- National Science Foundation (NSF), CISE/IIS, (review panelist and/or reviewer), several different years.
- National Science Foundation (NSF), ITR, (review panelist).
- National Science Foundation (NSF), DRMS Career award program.
- National Science Foundation (NSF), Decision, Risk and Management Sciences program.
- National Science Foundation (NSF), International Research Experience for Students (IRES) Program.
- National Science Foundation (NSF), Computation and Social Systems program, (twice).
- National Science Foundation (NSF), Computation and Social Systems program, (review panelist).
- National Science Foundation (NSF), Knowledge and Distributed Intelligence in the Information Age program.
- National Science Foundation (NSF), Computation and Social Systems program, (review panelist).
- National Science Foundation (NSF), Advanced Network Infrastructure and Research program.
- National Science Foundation (NSF), Information Technology and Organizations program, (review panelist).
- National Science Foundation (NSF), Computer Networks program.
- Natural Sciences and Engineering Research Council of Canada (NSERC), 2003.
- United States-Israel Binational Science Foundation, 2005.

- The Israel Science Foundation, 1998, 1999 (2), 2010.

Journals

- Science (multiple times).
- Journal of the ACM (JACM), 2001, 2004, 2010, 2011.
- Science Advances.
- Nature Communications.
- Operations Research, 2002, 2025.
- Journal of Computational and Applied Mathematics, 2025.
- SIAM Journal of Computing, 2000.
- Artificial Intelligence (Journal), 1995, 1996, 1997, 1999, 2000, 2002 (2), 2003, 2005, 2006 (2), many in between, 2009 (2), 2011.
- Machine Learning.
- Artificial Intelligence (Journal) Special issue on Computational Trade-offs under Bounded Resources, 1999.
- IEEE Transactions on Pattern Analysis and Machine Intelligence (Journal), multiple times.
- Games and Economic Behavior (Journal), 1998, 2000.
- Communications of the ACM, 2000.
- Journal of Artificial Intelligence Research (JAIR), 1996 (2), 1997 (3), 1999, 2000 (4), 2001 (3), 2002 (4), 2005, 2011.
- Journal of Economic Theory (JET).
- Review of Economic Studies (RES).
- Theoretical Computer Science.
- Journal of Automated Reasoning, Special issue on SAT 2000, 1999.
- Management Science, 2002 (3).
- Journal of Experimental Algorithmics.
- International Journal of Electronic Commerce (IJEC), 1999.
- Electronic Commerce Research Journal (ECR), 2002.

- IEEE Transactions on Systems, Man, and Cybernetics (Journal), 1997.
- Computational Intelligence (Journal), 1996, 1999, 2000.
- Computational Intelligence (Journal), Special Issue on Agent Technology for Electronic Commerce, 2002 (2).
- Naval Research Logistics, 2002.
- IEEE Expert (Journal), 1994.
- Information Processing Letters, 1999.
- IEEE Transactions on Data and Knowledge Engineering (Journal), 1996.
- INFORMS Journal of Computing, 2005.
- Journal of Experimental and Theoretical Artificial Intelligence (JETAI), 1996, 1997.
- Autonomous Agents and Multi-Agent Systems (Journal), 1997, 1998, 1999, 2000 (2), 2001, 2002 (3).
- American Economic Journal: Microeconomics, 2008.
- Decision Support Systems (Journal), 1999.
- Intelligent Manufacturing (Journal), 1997.
- IIE Transactions on Operations Engineering (Journal), Special issue on Game Theory Applications in Industry, 1998
- Artificial Intelligence (Journal) Special issue on Economic Principles of Multiagent Systems, 1995.
- ACM Computing Surveys, 2004.
- International Journal of Cooperative Information Systems (IJCIS), 1998.
- Software – Practice and Experience, 2002.

Conferences and workshops

- Conference on Neural Information Processing Systems (NeurIPS), 2026.
- ACM-SIAM Symposium on Discrete Algorithms (SODA), 2002, 2023.
- AAAI Conference on Artificial Intelligence (AAAI), Senior Member Track, 2014.
- Annual Symposium on Foundations of Computer Science (FOCS), 2011.
- International Conference on Parallel Processing (ICPP), 2009.

- International Joint Conference on Artificial Intelligence (IJCAI), 1995, 1997, 2001, 2005, 2025.
- National Conference on Artificial Intelligence (AAAI), 1996, 1997, 1998, 1999, 2000, 2006, 2007.
- International Conference on Machine Learning (ICML), 1996.
- Annual ACM Symposium on Theory of Computing (STOC), 1998, 2000, 2003, 2005.
- First ACM Conference on Electronic Commerce (EC), 1999.
- 8th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX), 2005.
- International Conference on Distributed Computing Systems (ICDCS), 2000.
- IEEE INFOCOM, The Conference on Computer Communications, 1998.
- First International Conference on Multiagent Systems (ICMAS), San Francisco, CA, 1995.
- First International Conference on Autonomous Agents (AGENTS), Marina del Rey, CA, 1997.
- Scandinavian Conference on Artificial Intelligence (SCAI), Special theme of the conference was Intelligent Agents, Helsinki, Finland, 1997.
- AAAI Spring Symposium Series: Satisficing Models, Stanford University, CA, 1998.
- International Joint Conference on Artificial Intelligence Workshop on Adaptation and Learning in Multiagent Systems, Montreal, Canada, 1995.
- European Conference on Artificial Intelligence Workshop on Learning in DAI Systems, Budapest, Hungary, 1996.
- AAAI Spring Symposium Series: Adaptation, Coevolution and Learning in Multiagent Systems, Stanford University, CA, 1996.

Professional affiliations

- American Association for Artificial Intelligence (AAAI)
- Association for Computing Machinery (ACM)
- The Game Theory Society
- Institute for Operations Research and the Management Sciences (INFORMS)
- Constraint Programming Society in North America (CPNA)

- American Economic Association (AEA)
- The Econometric Society
- American Association for the Advancement of Science (AAAS)
- Institute of Electrical and Electronics Engineers (IEEE)

Companies founded

Strategy Robot, Inc., 2/2018–
Founder, President, CEO, and Chairman
`www.strategyrobot.ai`
This CMU spinout is in the business of AI software solutions for strategic reasoning under imperfect information for US government military, intelligence, security, and cybersecurity applications.

Strategy Robot, Inc., a CMU Computer Science Department spinoff, is an AI software product company focused on planning against adversaries. We are the world leader in a subfield of AI called computational game theory, the only sound way of planning against adversaries. Most defense settings are imperfect-information games. They are games not in the sense of being recreational but in the sense that there is at least one adversary. They are games of imperfect information in that there is fog of war: the player does not know the state of the world exactly—e.g., an adversary's capabilities and locations. The players have private information that the other player(s) do not know. Imperfect-information games are much more difficult than perfect-information games, and algorithms for perfect-information games (such as AlphaGo) do not apply at all because they cannot address issues such as deceiving effectively, understanding deception by others, and reveal/conceal.

Today, military planning settings aren't treated in a sophisticated way as imperfect-information games. Instead, in planning, command and control, war gaming, and doctrine generation, *plans* (that is, *strategies* in game theory terminology) are generated manually based on gut feel, with simulation or table-top exercises sometimes as support tools. In DoD settings, Red and Blue typically have more possible strategies than the number of atoms in the universe. Yet only a tiny number of strategies for Red (typically 1-5) and for Blue (typically 1-100) are tested. So, only a vanishingly small portion of the strategy space is evaluated, causing enormous risks and overestimation of the strength of Blue's strategies (because Red's strategy space is not fully explored) and leaving significant opportunities on the table (because Blue's strategy space is not fully explored). Also, today's military plans are deterministic, while randomization is often needed to make strategies non-exploitable. Furthermore, hiring people to play Red in training, and hiring humans to do planning, is costly and slow.

In contrast, Strategy Robot's computational game theory tools compute optimal strategies for Blue and Red simultaneously, taking into account that Blue's optimal strategy depends on Red's strategy and Red's optimal strategy depends on Blue's strategy. Unlike in simulation, the players' strategies are output rather than input.

Computational game theory techniques have enjoyed a dramatic scalability increase over the last two decades. With his team, Dr. Sandholm has developed the most scalable algorithms for most classes of game, including the general-purpose game representations (extensive-form and normal-form), various application-specific game representations, and games with just simulator access. His team is the multi-time world champion in AI-v-AI no-limit Texas hold'em, which was the main benchmark and decades-open challenge problem for testing algorithms for solving imperfect-information games. That game has 10^{161} situations that a

player can face. Then, in well-recognized AI milestone events, his AIs reached superhuman level in the two-player [Science, 2018] and multiplayer setting [Science, 2019]. These milestones were recognized by many of the leading awards. Recently, he and his team reached superhuman performance in the even harder challenge problem of Fog-of-War Chess [ICLR, 2026].

Now that his AIs have become superhuman, there is a great opportunity to apply these technologies broadly into the DoD, Department of State, and other government agencies. The technologies, productized into Strategy Robot's *Game Solving System (GSS)*, have been developed with over $65M over 23 years. Strategy Robot has significant traction with DoD organizations, and reached profitability quickly while being 100% bootstrapped. The company has developed the following game-theoretic software products.

1. *Course-of-Action (COA) Generation and Execution System (CGES)*, which Strategy Robot has applied to generate:
    - the nation's best fighter pilot AIs (as vetted by DARPA and Air Force), and
    - the world's only superhuman large-scale C2/Battle Management System (as vetted by DARPA, the Army, USMC, SCO, and DIU). It is multi-domain and can handle any echelon. It has been used, for example, for:
        - armored combat (ground and air) COA generation and execution with thousands of ground assets and UAVs,
        - Carrier Strike Group COA generation and execution,
        - large-scale swarm (air, surface, and underwater) COA generation and execution and swarm loadout optimization, and
        - strategy generation for nuclear deterrence and optimal escalation/de-escalation,
2. Portfolio Planning and Deployment System,
3. Multi-Base Defense Planning and Execution System, and
4. Missile Defense and Offense Planning and Execution System.

Unlike ML, these game-theoretic tools do not need data about how the opponents have played previously (unlike supervised learning which requires prohibitive amounts of data) so they can be used in novel settings such as with space, swarm, hypersonic, autonomous, novel combat vehicles, directed energy, long-range precision fires, modern underground, offensive mining, nuclear (also tactical nuclear where no experience exists), and gray zone. Furthermore, unlike ML, RL, or Generative AI, they yield non-exploitable strategies.

Strategic Machine, Inc., 3/2017–
Founder, President, CEO, and Chairman
This CMU spinout is in the business of technology solutions for strategic reasoning under imperfect information. The company has exclusively licensed for this space from Prof. Sandholm's Carnegie Mellon University Electronic Marketplaces Laboratory the Libratus technology, which was the first to beat top professional poker players at Heads-Up No-Limit

Texas Hold'em, and a host of other technologies. The company targets a broad set of applications ranging from poker to other recreational games to business strategy, negotiation, cybersecurity, physical security, military applications, strategic pricing, product portfolio planning, finance, auctions, political campaigns, and steering evolution and biological adaptation, for example, for medical treatment planning.

Optimized Markets, Inc., 7/2012–
Founder, President, CEO, and Chairman
`www.optimizedmarkets.com`
CMU spinout in optimization and electronic marketplaces. Products are in advertising campaign sales, proposal generation, inventory allocation, scheduling, and pricing, optimization, as well as supply prediction.

Sandholm Enterprises, Ltd., 9/2011–
Founder, President, CEO, and Chairman
Consulting on market design and optimization; technology and software development; intellectual property generation and holding.

CombineNet, Inc. (acquired), 5/1999–6/2010
Founder and Chief Scientist 12/2008–6/2010
Founder, Chairman of the Board, and Chief Scientist 3/2006–11/2008
Founder, Chairman of the Board, and Chief Technology Officer 5/1999–2/2006
Fielded over 800 of the most complex combinatorial auctions in the world.
CombineNet develops and runs optimization systems for markets,
such as procurement auctions with expressive bidding.
Over 50 big-name customers (mainly Global 2,000 companies).
Grew to 130 employees with operations on four continents.
Over $60 billion in trading volume 2002–2010; over $6 billion saved.
Raised $44 million of venture capital.
First acquired 6/7/2010. Acquired by SciQuest (now Jaggaer) 9/2013.

Consulting work, corporate boards, and corporate advisory boards

2/2023–2/2024	**United States Marine Corp (USMC)** Top Secret / Sensitive Compartmented Information (TS/SCI) and Unclassified consulting and training on AI matters.
4/2014–6/2014	**Chicago Board Options Exchange (CBOE)** Legal expert on an automated market making patent case.

8/2012–1/2015 **Granata Decision Systems, Inc. (now part of Google)**
Chairman of the Board (6/2013–1/2015)
Board member, technical advisor, and business advisor (8/2012–1/2015)
Granata Decision Systems provided software that helps businesses and consumers make complex, data-driven group decisions. For one, it helps advertisers optimize the targeting of multiple campaigns.
Toronto, Canada

10/2011– **Technion-Microsoft Electronic Commerce Research Center**
(Founding) Scientific Advisory Board member
The Technion-Israel Institute of Technology, Microsoft Research (MSR) and Microsoft Online Services Division (OSD) co-established 10/2011 the Academic Research Center for E-Commerce Technologies. The new Research Center will promote and fund basic research in areas of computer science, artificial intelligence, game theory, economic and psychology, focusing on the connections between these subjects in the e-commerce domain. The center is the first academic research program by Microsoft Research in Israel, a part of the Microsoft R&D Center in Israel.

8/2010–8/2011 **swap.com / Netcycler**
Consultant
Helped re-design the core matching algorithm for their Internet barter exchange ("a moneyless eBay") to make them scalable. Invented the ways how barter chains can be employed for commercial (e.g., used) goods. Tens of thousands of users.

2/2009–8/2013 **Baidu**
Market design consultant
Helped Baidu completely redesign its sponsored search auctions. Already in the first two years of the engagement, monetization per eyeball doubled and Baidu's market cap increased from $10 billion to $50 billion. Also consulted on the design of their Internet display advertising markets.
Beijing, China

7/2012–11/2014 **Rare Crowds, Inc. (acquired by MediaMath 11/2014)**
Consulting Chief Scientist
Startup that developed capabilities for highly detailed targeting in display advertising markets.
Seattle and New York

2008	**Google** Legal expert on an electronic marketplaces patent case.
2005–2008	**Yahoo!** *Consultant* Re-designing Yahoo's display advertising market and sponsored search auctions. Gave several day-long tutorials and talks on expressive optimization-based markets for the purpose. Proposed the idea of a market that integrates campaign-based advertising and spot advertising, and Yahoo! is now using that idea, with some newer enhancements. Also, Yahoo! is using a version of our optimize-and-dispatch architecture. Sunnyvale, CA; Santa Clara, CA; Pasadena, CA; Burbank, CA
2/16/2006	**Mars, Inc.** Combinatorial optimization and expressive commerce. Mclean, VA
4/2001-12/2001	**Raytheon** Designing electronic marketplaces. Denver, CO
8/2000	**Pavillion Technologies, Inc.** Designing electronic marketplaces. Austin, TX
5/1999–6/1999	**perfect.com** (originally iwanto.com) Designing electronic marketplaces. Palo Alto, CA
1997–2001	**BusinessBots, Inc.** *Chief Scientist.* (Later I asked my duties to be reduced to *Technical Advisor.*) *Board observer.* Intelligent agent-mediated electronic marketplaces. Strategic alliance with Andersen Consulting. Member of CommerceNet consortium. Raised over $12,000,000 in venture financing. San Francisco, CA

6/1997 **Mitsubishi Horizon Systems Laboratory**
Designing electronic marketplaces, and economic resource allocation mechanisms for mobile agents.
Waltham, MA

7/1997–7/1998 **Hewlett Packard**
Automated negotiation, contracting, and electronic markets.
Bristol, UK

2/1997 **University of Ronneby**
Consulting on developing a market-based multiagent system for electricity distribution for Southern Sweden
Ronneby, Sweden

2/1997 **Lund University**
Consulting on developing a market-based multiagent system for electricity distribution for Southern Sweden
Lund, Sweden

7/1994 **Technical Research Centre of Finland**
Laboratory for Information Processing
Consulting on further development of the fielded EPO truck transportation optimization package
Espoo, Finland

1993 **Technical Research Centre of Finland**
Laboratory for Information Processing
Consulting on developing the EPO train transportation optimization package
Espoo, Finland

1989–2000 **Parodent Co. (acquired in 2000)**
Voting member, Board of Directors
Helsinki, Finland

CONTRACT AND GRANT SUPPORT

Total since 5/1/97 is $29,444,355, of which $18,664,360 as Principal Investigator. These figures do not include the $55,800,000 (12M + 1.8M + 6M + 12M + 12M + 9M + 3M) of venture capital raised. The dollar amounts also do not include the value of the grants of supercomputing time and advanced support.

Current academic grants

12/2025–	**Strategy Robot, Inc. funding to Prof. Sandholm's CMU laboratory** Tuomas Sandholm (PI) US$ 167,769
9/2025–	**My PhD student Itai Zilberstein is funded in part by an NSF Graduate Fellowship**
5/2025–9/2028	**Computing Supplement for Unified Scalable Computational Game Theory** *ONR* Tuomas Sandholm (PI) US$ 400,000
10/1/2023–9/30/2028	**Unified Scalable Computational Game Theory** *Vannevar Bush Faculty Fellowship (VBFF) (DoD ONR)* Tuomas Sandholm (PI) US$ 3,000,000
8/1/2023–7/31/2026	**RI: Medium: Techniques for Massive-Scale Strategic Reasoning: Imperfect-Information Subgame Solving and Offering Guarantees in Simulation-Based Games** *NSF CISE RI award 2312342* Tuomas Sandholm (PI) US$ 854,896

9/4/2023–5/31/2026 **Developing Machine Learning Models for Decision Support and Allocation Optimization in Heart Transplantation**
NIH award A240108S001
PI: Arman Kilic (MUSC). Co-PIs: Sandholm (CMU PI) and Padman (CMU)
US$ 1,870,282

7/1/2022– **Testing new agent evaluation techniques on supercomputed game data**
NSF XSEDE supercomputing grant CIS220066
Tuomas Sandholm (PI)
350 TB storage, 50,000 core hours. Estimated value $10,400.

Past academic grants

9/30/2022–9/29/2025 **Fast, Optimal AI Techniques for Game-Theoretic Team Coordination and Extensive-Form Correlation**
ARO award W911NF2210266
Tuomas Sandholm (PI)
US$ 834,614

1/1/2023–4/15/2024 **NSF Computing Innovation Fellow Postdoctoral Fellowship to do a postdoc in my laboratory (Stephen McAleer), extension.**
US$ 37,428

9/1/2023–5/15/2024 **Anonymous donor gift to pay for Prof. Sandholm's PhD student Ioannis Anagnostidis's tuition and stipend**
Around US$ 80,000

10/1/2019–9/30/2023 **RI: Medium: Learning to Search: Provable Guarantees and Applications**
NSF IIS-1901403
Nina Balcan (PI) and Tuomas Sandholm (co-PI)
US$ 1,199,995

1/31/2022–12/31/2023 **NSF Computing Innovation Fellow Postdoctoral Fellowship to do a postdoc in my laboratory (Stephen McAleer).**
US$ 255,010

9/1/2017–8/31/2022 **Algorithms in the Field: Algorithms and Mechanisms for Kidney Exchange**
NSF AitF
Ariel Procaccia (PI), Avrim Blum (co-PI), Tuomas Sandholm (co-PI)
US$ 799,621

2019–2021 **My PhD student Gabriele Farina received a Facebook Fellowship.**
Around US$ 200,000

4/30/2020–4/29/2021 **High-Performance CPU-GPU Compute Cluster for Research on Computational Game Theory and Biological Steering**
ARO DURIP
Tuomas Sandholm (PI)
US$ 485,750

9/1/2017–8/31/2020 **RI: Small: New Computational Techniques and Market Designs for Kidney Exchanges and Other Barter Markets**
NSF IIS
Tuomas Sandholm (PI)
US$ 420,000

3/20/2019–3/19/2020 **Facebook gift to Prof. Sandholm's CMU Electronic Marketplace Laboratory**
Facebook
Tuomas Sandholm (PI)
US$ 50,000

9/2015– **Information Brokers in Multi-Agent Systems and Mechanism Design Research Program**
ISF-NSFC
David Sarne and Pingzhong Tang (PIs)
Provides travel funding for me and my students to collaborate on kidney exchange research. Amount TBD.

2019–2021 **My PhD student (co-advised with Nina Balcan) Ellen Vitercik received an IBM Fellowship and a Fellowship in Digital Health (CMU's Center for Machine Learning and Health).**
Around US$ 176,272

1/16/2017–4/30/2020 **Steering T-Cell Adaptation Using Opponent Exploitation Algorithms and Computational Game Theory**
ARO
Tuomas Sandholm (PI) and Penelope Morel
US$ 750,000

7/1/2016–6/30/2019 **RI: Small: Computational Techniques for Large Multi-Step Incomplete-Information Games**
NSF Robust Intelligence
Tuomas Sandholm (PI)
US$ 450,000

2/2016–3/2021 **European Network for Collaboration on Kidney Exchange Programmes**
COST Action OC-2015-2
Joris Klundert (PI)
This is a very large grant among several European countries. I am an official foreign collaborator. Provides travel funding for me and my students to collaborate on kidney exchange work. Amount TBD.

2018–2019 **My PhD student Noam Brown received an Open Philanthropy AI Fellowship and a Tencent AI Lab Fellowship.**
Around US$ 200,000

7/1/2017–6/30/2018 **Supercomputing for equilibrium finding, biological steering, and kidney exchange**
NSF XSEDE, renewal of grant CCR090023
Tuomas Sandholm (PI)
7,024,270 Service Units (i.e., core hours) on the Bridges supercomputer CPUs, 2.6PB of storage, and 16,800 GPU Service Units.

2016–2019 **My PhD student (co-advised with Nina Balcan) Ellen Vitercik received the NSF Graduate Research Fellowship**
US$ 138,000

2016–2019 **My PhD student (co-advised with Nina Balcan) Ellen Vitercik received the Microsoft Research Women's Fellowship**
US$ 17,000

1/2017 **Sponsorship for the Brains vs. AI rematch**
Carnegie Mellon University, Rivers Casino, GreatPoint Ventures, Avenue4Analytics, TNG Technology Consulting, Artificial Intelligence, Intel, and Optimized Markets, Inc.
Tuomas Sandholm (PI)
US$ 200,000

2016-2017 **My PhD student Christian Kroer received a Facebook Fellowship**
US$ 161,000

10/23/2016–12/31/2016 **Supplement to supercomputer time grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)
6,276,000 Service Units (i.e., core hours) on the new Bridges supercomputer and 1 petabyte of storage.

1/1/2016–12/31/2016 **Renewal to supercomputer time grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)
10,000,000 Service Units (i.e., core hours) on the new Bridges supercomputer and 1.4 petabytes of storage.

9/1/2013–8/31/2016 **RI: Small: Expressiveness and Automated Bundling in Mechanism Design: Principles and Computational Methodologies**
NSF Robust Intelligence
Tuomas Sandholm (PI)
US$ 425,000

9/1/2015–8/31/2016 **EAGER: Exploiting a myopic opponent in imperfect-information games: Toward medical applications**
NSF Robust Intelligence
Tuomas Sandholm (PI)
US$ 100,000

2/5/2016–11/4/2016 **Initial Computational Research on Steering T Cell Differentiation**
Army Research Office (ARO)
Tuomas Sandholm (PI)
US$ 50,000

2015–2016 **Optimization-Based Digital Ad Campaign Sales and Allocation**
Adobe Digital Marketing Research Awards Program
Tuomas Sandholm (PI)
US$ 50,000

9/23/2015–1/5/2016 **San Diego Supercomputing Center's Director's Discretionary Award"**
NSF XSEDE
Tuomas Sandholm (PI)
1,600,000 Service Units (i.e., core hours) on Comet at the San Diego Supercomputing Center.

8/1/2015–7/29/2016 **My PhD student John Dickerson won a Siebel Fellowship**
US$ 80,000

6/1/2015–5/31/2016 **My PhD student John Dickerson received a Facebook Fellowship**
US$ 161,000

8/1/2011–7/31/2015 **AIR: Sophisticated Electronic Markets for TV Advertising, Powered by Novel Optimization**
NSF
Tuomas Sandholm (PI)
US$ 300,000

7/25/2013–7/31/2015 **Supplement for Sophisticated Electronic Markets for TV Advertising, Powered by Novel Optimization**
NSF AIR
Tuomas Sandholm (PI)
US$ 50,000

9/1/2012–5/31/2015 **My PhD student John Dickerson received a 2012 National Defense Science and Engineering Graduate (NDSEG) Fellowship**
US$ 218,410

8/15/2015–12/31/2015 **Supplement to supercomputer time grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)
200,000 Service Units (i.e., core hours) on Comet at the San Diego Supercomputing Center.

1/1/2015–12/31/2015 **Renewal to supercomputer time grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)
1,043,779 Service Units (i.e., core hours), worth $141,388, on the world's largest shared-memory supercomputer, Blacklight (4,096 cores and 32 Terabytes of RAM).

4/15/2014–12/31/2014 **Supplement (i.e., addition) to supercomputer time grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)
1,000,000 Service Units (i.e., core hours) on the world's largest shared-memory supercomputer, Blacklight (4,096 cores and 32 Terabytes of RAM). Also, 120 Terabytes of storage on the Data Supercell.

1/1/2014–12/31/2014 **Renewal (i.e., addition) to supercomputer time grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)
1,548,291 Service Units on the world's largest shared-memory supercomputer, Blacklight (4,096 cores and 32 Terabytes of RAM).

4/2015–5/2015 **Sponsorship for the Brains Vs. AI event**
Microsoft Research
Tuomas Sandholm (PI)
US$ 50,000

4/2015–5/2015 **Sponsorship for the Brains Vs. AI event**
Rivers Casino
Tuomas Sandholm (PI)
US$ 50,000

4/2015–5/2015 **Sponsorship for the Brains Vs. AI event**
Artificial Intelligence journal (Elsevier)
Tuomas Sandholm (PI)
Euro 3,000

9/1/2012–8/31/2014 **Drug Design and Treatment Planning via Sequential Games**
Microsoft Computational Thinking Center at CMU
Tuomas Sandholm (PI)
US$ 75,000

6/17/2010–5/31/2014 **RI: Medium: Abstraction, Equilibrium Finding, Safe Opponent Exploitation, and Robust Strategies for Imperfect-Information Games**
NSF
Tuomas Sandholm (PI)
US$ 719,830

5/1/2011–4/30/2014 **ICES: Small: New and Better Markets via Automated Market Making**
NSF
Tuomas Sandholm (PI)
US$ 324,340

5/19/2013–12/31/2013 **Supplement to supercomputer time grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)
250,000 Service Units on the world's largest shared-memory supercomputer (4,096 cores and 32 Terabytes of RAM).

10/1/2011–9/30/2013 **Supercomputer time grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)
4,000,000 Service Units on the world's largest shared-memory supercomputer (4,096 cores and 32 Terabytes of RAM).

10/1/2011–9/30/2013 **Supercomputer advanced support (ASTA) grant "Large-shared-memory supercomputing for game-theoretic analysis with fine-grained abstractions, and novel tree search algorithms"**
NSF XSEDE
Tuomas Sandholm (PI)

7/1/2009–6/30/2012 **RI: Medium: Algorithms for Robust Barter Exchanges, with Application to Kidneys**
NSF
Tuomas Sandholm (PI)
US$ 855,259

10/1/2011–5/30/2012 **My PhD student Abe Othman received the Google scholarship in Market Algorithms**
Google
US$ 75,600

4/1/2010–3/31/2011 **Supercomputer time grant "Leveraging supercomputing for large-scale game-theoretic analysis: Renewal"**
NSF XSEDE
Tuomas Sandholm (PI)
360,000 Service Units on a 768-core 1.5 Terabyte RAM cc-NUMA shared-memory supercomputer. Later converted to allocation on the world's largest shared-memory supercomputer (4,096 cores and 32 Terabytes of RAM).

4/1/2010–3/31/2011 **Supercomputer advanced support (ASTA) grant "Leveraging supercomputing for large-scale game-theoretic analysis: Renewal"**
NSF XSEDE
Tuomas Sandholm (PI)

10/2009 **CombineNet, Inc. gift to CMU**
Tuomas Sandholm (PI)
US$ 14,000

8/2010–8/2011 **Siebel fellowship for PhD student Michael Benisch**
US$ 35,000

4/1/2009–3/31/2010 **Supercomputer time grant "Solving large sequential games of imperfect information"**
NSF XSEDE
Tuomas Sandholm (PI)
400,000 Service Units on a 768-core 1.5 Terabyte RAM cc-NUMA shared-memory supercomputer.

9/1/2004–8/31/2009 **ITR - (ECS + ASE) - (dmc + soc): Automated Mechanism Design**
NSF ITR (Information Technology Research)
Tuomas Sandholm (PI)
US$ 1,100,000

9/1/2008–7/1/2009 **Computational Thinking for Optimal Kidney Exchange**
Funded by Microsoft Research, at Carnegie Mellon University PROBE (PRoblem-Oriented Exploration)
Tuomas Sandholm (PI)
US$ 65,000

12/2008 **CombineNet, Inc. gift to CMU**
Tuomas Sandholm (PI)
US$ 13,867

8/2008–8/2009 **Siebel fellowship for PhD student Andrew Gilpin**
US$ 25,000

3/2008–3/2009 **'Friendly user' time grant on new Altix machines**
NSF XSEDE
Tuomas Sandholm (PI)

10/9/2007 **Machine gift from Intel Corporation**
Tuomas Sandholm (PI)
US$ 39,192

10/1/2007–9/30/2008 **CombineNet, Inc. gift to CMU**
Tuomas Sandholm (PI)
US$ 13,000

5/2007 **Susquehanna International Group (SIG) gift to CMU**
Tuomas Sandholm (PI)
US$ 25,000

5/1/2007–4/30/2008 **Yahoo! fellowship for PhD student David Abraham**
US$ 5,000

10/1/2006–9/30/2007 **CombineNet, Inc. gift to CMU**
Tuomas Sandholm (PI)
US$ 12,800

9/15/2001–8/31/2006 **ITR/PE+SY: Collaborative Research: Foundations of Electronic Marketplaces: Game Theory, Algorithms, and Systems**
NSF ITR (Information Technology Research)
Tuomas Sandholm (PI)
Co-PIs: Avrim Blum (CMU), Subhash Suri (UCSB CS), Mark Satterthwaite (Northwestern University, MEDS), Rakesh Vohra (Northwestern University, MEDS), Ming Kao (Northwestern University, CS).
US$ 2,800,000
Share of Carnegie Mellon University (lead university): $ 1,200,338.

9/16/2003–9/15/2006 **Alfred P. Sloan Foundation Fellowship**
Tuomas Sandholm (PI)
US$ 40,000

10/1/2005–9/30/2006 **CombineNet, Inc. gift to CMU**
Tuomas Sandholm (PI)
US$ 12,000

9/1/2005–8/31/2006 **IBM Fellowship**
To fund my PhD student Vincent Conitzer
US$ 48,815

1/1/2001–8/31/2004 **ITR/SOC: Secure Automated Negotiation under Limited Computation: Deliberation in Equilibrium**
NSF ITR (Information Technology Research)
Tuomas Sandholm (PI)
US$ 388,225
Entire amount transferred from Washington University to CMU

5/1/1998–8/31/2003 **Advanced Contract Types for Automated Negotiation**
NSF (Computation and Social Systems)
Tuomas Sandholm (PI)
US$ 120,000
Balance $71,900 transferred from Washington University to CMU

6/1/1997–5/31/2003 **Coalition Formation among Self-Interested Computationally Limited Agents**
NSF CAREER award (Information Technology and Organizations)
Tuomas Sandholm (PI)
US$ 456,098
Balance $177,502 transferred from Washington University to CMU

7/15/1997–9/30/2000 **Optimal Mechanisms for Negotiation under Message Passing and Belief Revision**
NSF (Information Technology and Organizations)
Tuomas Sandholm (PI), Ronald Loui
US$ 199,052

5/1/1997–4/30/2000 **High Performance Distributed Object Environment with Emphasis on Adaptive End-to-end QoS Guarantees**
DARPA (Quorum program)
Guru Parulkar (PI), Douglas Schmidt, Tuomas Sandholm, Jonathan Turner
US$ 650,000

8/1/1992–12/31/1992 **Neural Networks in Bankruptcy Prediction**
Technical Research Centre of Finland
Laboratory for Information Processing
Grantor: Remote Area Development Fund
Tuomas Sandholm (PI)
Funding approved but project never initiated (PI went to graduate school)
100,000 Finnish marks

1/31/1992–12/31/1992 **Intelligent Agents (INTELAGENT)**
Technical Research Centre of Finland
Laboratory for Information Processing
Seppo Linnainmaa (PI), Tuomas Sandholm, Aarno Lehtola.
500,000 Finnish marks

Industrial grants received

1/1/2014–6/30/2014 **SBIR Phase I: Advertising Sales and Traffic Optimization: Difficult Customer-Requested Optimization Constraints and Scalability on Real Data**
NSF SBIR
Tuomas Sandholm (PI). I later transferred the official PI-ship to my PhD student John Dickerson due to SBIR full-time regulations.
US$ 150,000

8/1/2011–7/31/2013 **Matching funds for the NSF Accelerating Innovation Research grant**
Innovation Works and CMU
Tuomas Sandholm (PI).
US$ 300,000

6/2002–6/2005 **Scalable and Usable Technology for Markets with Expressive**
Bidding
NIST, US Department of Commerce Advanced Technology Program (ATP)
Tuomas Sandholm (PI). Awarded to CombineNet, Inc.
US$ 1,836,530

11/1/1997–10/31/2000 **An open component-based architecture for Internet commerce**
NIST, US Department of Commerce Advanced Technology Program (ATP)
Awarded to BusinessBots, Inc., CommerceNet, CNGroup, and Tesserae Information Systems
US$ 5,000,000

EVIDENCE OF TEACHING PERFORMANCE

COURSES TAUGHT

Fall 2026 **CS 15-888 Computational Game Solving**
Professor, Carnegie Mellon University
PhD-level lectured course in CMU's Computer Science Department.
Co-taught with my PhD student Ioannis Anagnostides.

Spring 2026 **CS 15-281 Artificial Intelligence: Representation and Problem Solving**
Professor, Carnegie Mellon University
CMU's undergraduate introduction to AI course.

Fall 2025 **CS 15-888 Computational Game Solving**
Professor, Carnegie Mellon University
PhD-level lectured course in CMU's Computer Science Department.
Co-taught with my PhD student Ioannis Anagnostides.
Course evaluation: 5.0/5

Spring 2025 **CS 15-281 Artificial Intelligence: Representation and Problem Solving**
Professor, Carnegie Mellon University
CMU's undergraduate introduction to AI course.
Co-taught with Vincent Conitzer.

Fall 2024 **CS 15-888 Computational Game Solving**
Professor, Carnegie Mellon University
PhD-level lectured course in CMU's Computer Science Department.
Co-taught with my PhD student Brian Hu Zhang.
Course evaluation: 4.71/5

Spring 2024 **CS 15-281 Artificial Intelligence: Representation and Problem Solving**
Professor, Carnegie Mellon University
CMU's undergraduate introduction to AI course.
Co-taught with Nihar Shah.
120 students

Fall 2023 **CS 15-888 Computational Game Solving**
Professor, Carnegie Mellon University
PhD-level lectured course in CMU's Computer Science Department.
Co-taught with my Postdoctoral Research Associate Stephen McAleer.
Pittsburgh Campus
Course evaluation: 4.90/5

Spring 2023 **CS 15-780: Graduate Artificial Intelligence**
Cross-listed in the Robotics Institute as
16-731: Fundamentals of AI for Robotics.
Professor, Carnegie Mellon University
CMU's graduate AI core course.
Co-taught with Aditi Raghunathan.

Fall 2022 **CS 15-784 Foundations of Cooperative AI**
Professor, Carnegie Mellon University
New PhD-level lectured course in CMU's Computer Science Department.
Co-taught with Vincent Conitzer and Caspar Oesterheld.
Pittsburgh Campus
25 students.

Fall 2021 **CS 15-888 Computational Game Solving**
Professor, Carnegie Mellon University
New PhD-level lectured course in CMU's Computer Science Department.
Co-taught with my PhD student Gabriele Farina.
Pittsburgh Campus
13 students finished the course.
Course evaluation: 4.75/5

Spring 2018 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the School of Computer Science eBiz program.
Pittsburgh Campus
73 students finished the course.

Fall 2017 **CS 15-381 Artificial Intelligence: Representation and Problem Solving (= CMU's Undergraduate AI)**
Professor, Carnegie Mellon University
CMU's AI core course at the undergraduate level.
Co-taught with Tai-Sing Lee.
128 students.

Fall 2017 **CS 15-681 Artificial Intelligence: Representation and Problem Solving (= CMU's MS-level AI)**
Professor, Carnegie Mellon University
CMU's AI core course at the undergraduate and graduate level.
Co-taught with Tai-Sing Lee.
14 students.

7/18–7/21/2017 **Intensive course: "AI perspectives, kidney exchange, and solving imperfect-information games"**
Shanghai University of Finance and Economics

Spring 2017 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus
56 students

Spring 2016 **CS 15-780: Graduate Artificial Intelligence**
Cross-listed in the Robotics Institute as
16-731: Fundamentals of AI for Robotics.
Professor, Carnegie Mellon University
CMU's graduate AI core course.
Co-taught with Zico Kolter.
We completely revamped and modernized the course to be focused deeply on techniques, and to be oriented to PhD students. Some innovative aspects included search, SAT, CSP, and integer programming is one body of knowledge, as well as convex optimization as a fundamental tool in AI and its use as a driving tool in machine learning, including deep learning. The course also had seven extensive homework sets, each with both a written part and a programming part.
64 students successfully finished the class.

Spring 2016 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus
All 86 students finished the course successfully.

Fall 2015 **CS 15-892: Foundations of Electronic Marketplaces**
Professor, Carnegie Mellon University
Ph.D.-level course in the computer science department.
URL: `www.cs.cmu.edu/~ sandholm/cs15-892F15/cs15-892.htm`

Spring 2015 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus
All 78 students finished the course successfully.

Spring 2014 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Fall 2013 **CS 15-892: Foundations of Electronic Marketplaces**
Professor, Carnegie Mellon University
Ph.D.-level course in the computer science department.
URL: `www.cs.cmu.edu/~ sandholm/cs15-892F13/cs15-892.htm`
Evaluation: instructor 4.8/5, course 4.8/5.

Spring 2013 **CS 15-780: Advanced Artificial Intelligence**
Cross-listed in the Robotics Institute as
16-731: Fundamentals of AI for Robotics.
Professor, Carnegie Mellon University
CMU's graduate AI core course.
Co-taught with Manuela Veloso.

Spring 2013 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Spring 2012 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Fall 2011 **CS 15-892: Foundations of Electronic Marketplaces**
Professor, Carnegie Mellon University
Ph.D.-level course in the computer science department.
URL: `www.cs.cmu.edu/~ sandholm/cs15-892F11/cs15-892.htm`

Spring 2011 **CS 15-780: Advanced Artificial Intelligence**
Cross-listed in the Robotics Institute as
16-731: Fundamentals of AI for Robotics.
Professor, Carnegie Mellon University
CMU's graduate AI core course.
Co-taught with Geoff Gordon.
URL: `www.cs.cmu.edu/~ sandholm/cs15-780S11/index.html`

Spring 2011 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Spring 2010 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Fall 2009 **CS 15-892: Foundations of Electronic Marketplaces**
Professor, Carnegie Mellon University
Ph.D.-level course in the computer science department,
with attendees from the Tepper School of Business and SEI as well.
URL: `www.cs.cmu.edu/~ sandholm/cs15-892F09/cs15-892.htm`
Course evaluation: instructor 4.75/5, course 4.50/5.

Spring 2009 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Spring 2009 **CS 15-780: Advanced Artificial Intelligence**
Cross-listed in the Robotics Institute as
16-731: Fundamentals of AI for Robotics.
Professor, Carnegie Mellon University
CMU's graduate AI core course.
Co-taught with Geoff Gordon.
Completely redesigned the content from scratch.
Course rating 4.50/5.
URL: `www.cs.cmu.edu/~ sandholm/cs15-780S09/index.html`
Course evaluation: 4.50/5.

Spring 2008 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Fall 2007 **CS 15-892: Foundations of Electronic Marketplaces**
Professor, Carnegie Mellon University
Ph.D.-level course in the computer science department.
Course evaluation: instructor 4.80/5, course 4.80/5.

Spring 2007 **Electronic Negotiation Task**
Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Spring 2006 **Electronic Negotiation Task**
Associate Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
Pittsburgh Campus

Spring 2006 **Electronic Negotiation Task**
Associate Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.
West Coast Campus

Fall 2005 **CS 15-892: Foundations of Electronic Marketplaces**
Associate Professor, Carnegie Mellon University
Ph.D.-level course in the computer science department.

Spring 2005 **CS 15-780: Advanced Artificial Intelligence**
Cross-listed in the Robotics Institute as
16-731: Fundamentals of AI for Robotics.
Associate Professor, Carnegie Mellon University
CMU's graduate AI core course.
Co-taught with Michael Lewicki.
Completely redesigned the content from scratch.
URL: `www.cs.cmu.edu/~ lewicki/15-780/`

Spring 2005 **Electronic Negotiation Task**
Associate Professor, Carnegie Mellon University
M.S.-level task-oriented course in the ecommerce program.

Summer 2004 **Electronic Negotiation**
Associate Professor, Carnegie Mellon University
M.S.-level remote education course. (UTC program.)

Summer 2004 **Electronic Negotiation Task**
Associate Professor, Carnegie Mellon University
M.S.-level task-oriented remote education course.

Spring 2004 **EC 20-853 Electronic Negotiation**
Associate Professor, Carnegie Mellon University
URL: `www.cs.cmu.edu/~ sandholm/ec20-853/ec20-853.htm`
M.S.-level course in the ecommerce program.

Fall 2003 **CS 15-892: Foundations of Electronic Marketplaces**
Associate Professor, Carnegie Mellon University
URL: `www.cs.cmu.edu/~ sandholm/cs15-892/cs15-892.htm`
Ph.D.-level course in the computer science department.

July–September 2003 **Electronic Negotiation**
Associate Professor, Carnegie Mellon University
New M.S.-level remote education course. (UTC program.)

May–June 2003 **Electronic Negotiation Task**
Associate Professor, Carnegie Mellon University
New M.S.-level task-oriented course, partly done as remote education.
CMU West, Moffett Field, CA.

Spring 2003 **EC 20-853 Electronic Negotiation**
Associate Professor, Carnegie Mellon University
URL: `www.cs.cmu.edu/~ sandholm/ec20-853 S03/ec20-853.htm`
M.S.-level course in the ecommerce program.

Fall 2002 **CS 15-381 Artificial Intelligence: Representation and Problem Solving (= CMU's Undergraduate AI)**
Associate Professor, Carnegie Mellon University
URL: `www.cs.cmu.edu/~ sandholm/cs15-381`
CMU's undergraduate Introduction to AI course.

Spring 2002 **EC 20-853 Electronic Negotiation**
Associate Professor, Carnegie Mellon University
URL: `www.cs.cmu.edu/~ sandholm/ec20-853 S02/ec20-853.htm`
New M.S.-level course in the ecommerce program.
Course evaluation averages: Teacher 5.0/5, Course 5.0/5.

Fall 2001 **CS 15-892: Foundations of Electronic Marketplaces**
Associate Professor, Carnegie Mellon University
URL: `www.cs.cmu.edu/~ sandholm/cs15-892F01/cs15-892.htm`
New Ph.D.-level course in the computer science department.

Spring 2000 **CS 511: Artificial Intelligence I**
Assistant Professor, Washington University
Graduate-level intro to AI, but 70% of the students were undergraduates.
URL: `www.cs.cmu.edu/~ sandholm/CS511A_SP00/syllabus/syllabus.html`

Spring 2000 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University

Fall 1999 **CS 520A: Intelligent Real-Time Systems**
Assistant Professor, Washington University
M.S. & Ph.D. level, but a third of the students were undergraduates.
URL: `www.cs.cmu.edu/~ sandholm/CS520A_FA99/syllabus/syllabus.html`

Fall 1999 **CS 6744: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University

Spring 1999 **CS 511: Artificial Intelligence I**
Assistant Professor, Washington University
Graduate-level intro to AI, but 70% of the students were undergraduates.
URL: `www.cs.cmu.edu/~ sandholm/CS511A_SP99/syllabus/syllabus.html`

Spring 1999 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University

Fall 1998 **CS 516A: Multiagent Systems**
Assistant Professor, Washington University
M.S. & Ph.D. level, but a fourth of the students were undergraduates.
URL: `www.cs.cmu.edu/~ sandholm/CS516A_FA98/syllabus/syllabus.html`

Fall 1998 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University

Spring 1998 **CS 511: Artificial Intelligence I**
Assistant Professor, Washington University
Graduate-level intro to AI, but 70% of the students were undergraduates.
URL: `www.cs.cmu.edu/~ sandholm/CS511A_SP98/syllabus/syllabus.html`

Spring 1998 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University

Fall 1997 **CS 520A: Intelligent Real-Time Systems**
Assistant Professor, Washington University
M.S. & Ph.D. level, but a fourth of the students were undergraduates.
URL: `www.cs.cmu.edu/~ sandholm/CS520A_FA97/syllabus/syllabus.html`

Fall 1997 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University

Spring 1997 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University

Fall 1996 **CS 516A: Multiagent Systems**
Assistant Professor, Washington University
M.S. & Ph.D. level, but a fourth of the students were undergraduates.
URL: `www.cs.cmu.edu/~ sandholm/CS516A_FA96/syllabus/syllabus.html`

Fall 1995 **CS 187: Programming with Data Structures**
Teaching Associate, University of Massachusetts, Amherst
Full lecturing responsibility.
Sophomore level.

EDUCATION IN TEACHING

1995 **University of Massachusetts, Amherst**
Teacher orientation

1991 **Helsinki University of Technology, Finland**
Semester long *Conducting Small Group Activities* course
(practicum)

1989 **Helsinki University of Technology, Finland**
Semester long *Speech Communication* course

CONTRIBUTIONS TO EDUCATION

NEW COURSES GENERATED

Fall 2022 **CS 15-784 Foundations of Cooperative AI**
Professor, Carnegie Mellon University
New PhD-level lectured course in CMU's Computer Science Department.
Co-taught with Vincent Conitzer and Caspar Oesterheld.
Pittsburgh Campus

Fall 2021 **CS 15-888 Computational Game Solving**
Professor, Carnegie Mellon University
New PhD-level lectured course in CMU's Computer Science Department.
Co-taught with my PhD student Gabriele Farina.
Pittsburgh Campus

8/2002–6/2003 **Electronic Negotiation Task**
Associate Professor, Carnegie Mellon University
New M.S.-level task-oriented course, sometimes offered partly or entirely as remote education.
CMU West, Moffett Field, CA.

Spring 2002 **EC 20-853 Electronic Negotiation**
Associate Professor, Carnegie Mellon University
`www.cs.cmu.edu/~ sandholm/ec20-853 S02/ec20-853.htm`
M.S.-level course in the ecommerce program. Also used in video format for remote education versions of this course.

Fall 2001 **CS 15-892: Foundations of Electronic Marketplaces**
Associate Professor, Carnegie Mellon University
`www.cs.cmu.edu/~ sandholm/cs15-892/cs15-892.htm`
Ph.D.-level course in the computer science department.

Fall 1999 **CS 520A: Intelligent Real-Time Systems (first offered in Fall 1997)**
Assistant Professor, Washington University
M.S. & Ph.D. level, but a third of the students were undergraduates.
`www.cs.cmu.edu/~ sandholm/CS520A_FA99/syllabus/syllabus.html`

Fall 1998 **CS 516A: Multiagent Systems (first offered in Fall 1996)**
Assistant Professor, Washington University
M.S. & Ph.D. level, but a fourth of the students were undergraduates.
`www.cs.cmu.edu/~ sandholm/CS516A_FA98/syllabus/syllabus.html`

Fall 1997 **CS 520A: Intelligent Real-Time Systems**

Assistant Professor, Washington University

M.S. & Ph.D. level, but a fourth of the students were undergraduates.

`www.cs.cmu.edu/~ sandholm/CS520A_FA97/syllabus/syllabus.html`

Topics included: models for representing computational limitations and tradeoffs, decision theory and rational choice, the value of information, the deliberative vs. reactive debate, principles of meta-reasoning, real-time search, memory-bounded search, utility-directed search, deliberation scheduling (control of reasoning), soft real-time, anytime algorithms, design-to-time algorithms, dynamic planning and execution, reinforcement learning, and evaluation of resource-bounded reasoning techniques.

Fall 1996 **CS 516A: Multiagent Systems**

Assistant Professor, Washington University

M.S. & Ph.D. level, but a fourth of the students were undergraduates.

`www.cs.cmu.edu/~ sandholm/CS516A_FA96/syllabus/syllabus.html`

Collected readings from a variety of sources and wrote handouts because no adequate textbook exists

Co-wrote a textbook for this class (Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence, edited by Weiss, MIT Press 1999).

Multiagent systems research, a subfield of artificial intelligence, studies the interactions of computational agents. These agents can represent real world parties, and they can have different preference structures. A key research goal is to design open distributed systems in a principled way that leads to globally desirable outcomes even though every participating agent only considers its own good and may act insincerely. The course covers relevant results in AI, game theory, market mechanisms, voting, auctions, coalition formation, and contracting. Effects of different computational limitations of the agents are discussed. Questions of common knowledge and recursive modeling are addressed. Software tools for multiagent systems are presented. Application examples are presented in electronic commerce, networks, operating systems, manufacturing, and logistics.

EXISTING COURSES COMPLETELY REDESIGNED

Spring 2009, 2011, 2016 — **CS 15-780: Advanced Artificial Intelligence**
Cross-listed in the Robotics Institute as
16-731: Fundamentals of AI for Robotics.
Professor, Carnegie Mellon University
CMU's graduate AI core course.
Co-taught with Geoff Gordon 2009, 2011, and with Zico Kolter 2016.
Completely redesigned the content.

Spring 2005 — **CS 15-780: Advanced Artificial Intelligence**
Cross-listed in the Robotics Institute as
16-731: Fundamentals of AI for Robotics.
Associate Professor, Carnegie Mellon University
CMU's graduate AI core course.
Co-taught with Michael Lewicki.
Completely redesigned the content from scratch.

Fall 2002 — **CS 15-381 Artificial Intelligence: Representation and Problem Solving**
Associate Professor, Carnegie Mellon University
`www.cs.cmu.edu/~ sandholm/cs15-381`
CMU's undergraduate Introduction to AI course.

Spring 2000 — **CS 511: Artificial Intelligence I**
Assistant Professor, Washington University
Graduate-level intro to AI, but 70% of the students were undergraduates.
`www.cs.cmu.edu/~ sandholm/CS511A_SP00/syllabus/syllabus.html`

Spring 2000 — **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University
Topics: Combinatorial auctions, electronic commerce, and common knowledge.

Fall 1999 — **CS 6744: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University
Topics: Computing equilibria for games, theory of coalition-proof implementation, theory of implementation when the center has limited computation, auctions, using combinatorial game theory to solve adversarial games.

Spring 1999 **CS 511: Artificial Intelligence I**
Assistant Professor, Washington University
Graduate-level intro to AI, but 70% of the students were undergraduates.
`www.cs.cmu.edu/~ sandholm/CS511A_SP99/syllabus/syllabus.html`

Spring 1998 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University
Topic: Voting and computational complexity.

Spring 1998 **CS 511: Artificial Intelligence I**
Assistant Professor, Washington University
Graduate-level intro to AI, but 70% of the students were undergraduates.
`www.cs.cmu.edu/~ sandholm/CS511A_SP98/syllabus/syllabus.html`
Regenerated previously existing course from scratch.
Completely modernized the content.

Spring 1999 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University
Topics: Next generation auctions, electronic commerce, and reinforcement learning.

Fall 1998 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University
Topics: Electronic commerce servers, and search algorithms for adversarial games.

Fall 1997 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University
Topics included: Resource-bounded reasoning, game theory, and coalition formation

Spring 1997 **CS 6745: Research Seminar on Artificial Intelligence**
Assistant Professor, Washington University
Topics included: Reasoning about knowledge, recursive agent modeling, resource-bounded reasoning, game theory, and coalition formation

OTHER EDUCATION SERVICE

1997– **Prepared and delivered tens of tutorials and summer schools**
(These are listed in other sections.)

Fall 1995 **CS 187: Programming with Data Structures**
Teaching Associate, University of Massachusetts, Amherst
Full semester-long lecturing responsibility to 40-student section while being a PhD student, as well as generation and grading of exams.
Professor in charge: Paul Utgoff

1986 *Computer English* **education video**
Participant
Used in Finland to teach computer literacy in English at the B.S. level

OTHER EDUCATION-RELATED SERVICE WHILE A STUDENT

1. Member, Helsinki University of Technology Student Body Parliament
2. Revisor, Finnish Artificial Intelligence Society
3. Revisor, Production Economy Guild
4. Founding Member, European Students of Industrial Engineering and Management
5. Member, AIESEC HUT Executive Committee
6. Captain, Production Economy Guild Freshman Activities
7. Member, Machine Engineer Guild Government
8. Member, Kulosaari Co-Educational School Board
9. Chairman, Kulosaari Co-Educational School, High School Directariat

RESEARCH SUPERVISING

CURRENT RESEARCH SUPERVISING

1. Ioannis Anagnostides (PhD student), 8/2021–. Topics: Equilibrium finding, dynamics, last-iterate convergence, and heart allocation policy optimization
2. Carlos Martin (PhD student), 8/2019–. Topics: Equilibrium finding in continuous games and with many players, , exploration in imperfect-information games, real-time strategy games, planning in the imagination.
3. Itai Zilberstein (PhD student), 8/2025–. Topics: Heart allocation policy optimization, etc.
4. Pranav Rajbhandari (PhD student), 8/2025–. Topics: Equilibrium finding in imperfect-information games.
5. Juho Kim (PhD student), 8/2025–. Topics: Equilibrium finding and variance reduction in imperfect-information games.
6. Fabian Pieroth (Visiting Scholar), 9/2023–3/2024, and continuing collaboration. Topics: Equilibrium finding, game exploration, auctions.
7. Prof. Tri-Dung Nguyen (Visitor) 12/2013, 7/2015, and continuing collaboration. Topics: Incentive auctions, combinatorial exchanges.

THESES SUPERVISED AND THESIS COMMITTEES

Doctoral students

1. *Ph.D. advisor*, Brian Zhang, 8/2019–9/2025. Dissertation: *New Solution Concepts and Algorithms for Equilibrium Computation and Learning in Extensive-Form Games and Beyond*. First position after graduation: Postdoc at MIT EECS.
2. *Ph.D. advisor*, Siddharth Prasad (co-advised with Nina Balcan), 8/2019—9/2025. Dissertation: *Mechanism Design and Integer Programming in the Data Age*. First position after graduation: Research Assistant Professor at TTI.
3. *Ph.D. advisor*, Gabriele Farina, 8/2016–5/2023. Dissertation *Game-Theoretic Decision Making in Imperfect-Information Games: Learning Dynamics, Equilibrium Computation, and Complexity*, defence 4/6/2023. Research Scientist at Meta AI during last year of PhD program. Then Assistant Professor at MIT EECS starting Fall 2023.
4. *Ph.D. advisor* (together with Prof. Nina Balcan), Ellen Vitercik, 9/2015–8/2021. Dissertation *Automated Algorithm and Mechanism Configuration* defended 7/28/2021. First position after graduation: Miller Fellow postdoc at UC Berkeley EECS, followed by Assistant Professor position at Stanford (50-50 between Computer Science (CS) and Management Science and Engineering (MS&E)).

5. *Ph.D. advisor*, Noam Brown, 10/2012–9/2020 (was MS student until 5/2014). Dissertation *Equilibrium Finding for Large Adversarial Imperfect-Information Games* defended 9/16/2020. First position after graduation: Facebook AI Research (FAIR).

6. *Ph.D. advisor*, Christian Kroer, 5/2012–9/2018. Dissertation *Large-Scale Sequential Imperfect-Information Game Solving: Theoretical Foundations and Practical Algorithms with Guarantees* defended 9/12/2018. First position after graduation: Columbia University, Industrial Engineering and Operations Research, tenure-track assistant professor. (Decided to do a one-year postdoc at Facebook Research before starting at Columbia.)

7. *Ph.D. advisor*, John Dickerson, 8/2010–8/2016. Dissertation *A Unified Approach to Dynamic Matching and Barter Exchange* defended 8/26/2016. First position after graduation: University of Maryland, College Park, Computer Science, tenure-track assistant professor.

8. *Ph.D. advisor*, Sam Ganzfried, 6/2007–5/2015. Dissertation *Computing Strong Game-Theoretic Strategies and Exploiting Suboptimal Opponents in Large Games*.

9. *Ph.D. advisor*, Abe Othman, 8/2007–5/2012. Dissertation *Automated Market Making: Theory and Practice* defended 4/24/2012. First job after graduation: co-founder of a startup in the Bay Area: Building Robotics, Inc. Also fielded our course allocation market design and algorithm from our AAMAS-10 paper at Wharton.

10. *Ph.D. advisor*, Michael Benisch (co-advised with Norman Sadeh), 2007–5/2011. Dissertation *Using Expressiveness to Improve the Efficiency of Social and Economic Mechanisms* defended 3/28/2011. First job after graduation: Director of AI at Rocket Fuel. Then Director of Autonomy at Lyft.

11. *Ph.D. advisor*, Andrew Gilpin, 8/2002–5/2009. Dissertation: *Algorithms for Abstracting and Solving Imperfect Information Games*. First job after graduation: Founding Partner, Hg Analytics, LLC (an algorithmically-traded hedge fund), New York City, and Adjunct Assistant Professor, Computer Science Department, Carnegie Mellon University.

12. *Ph.D. advisor*, Vincent Conitzer. Dissertation *Computational Aspects of Preference Aggregation* defended 7/24/2006. First job after graduation: tenure-track assistant professor at Duke University, Computer Science, with secondary appointment in the Department of Economics. In 2011, got promoted directly from assistant professor to endowed full professor.

13. *Ph.D. advisor*, Kate Larson. Dissertation *Mechanism Design for Computationally Limited Agents* defended 6/16/2004. Graduated 8/2004. First job after graduation: tenure-track assistant professor at University of Waterloo, Computer Science; later received early tenure.

14. *Ph.D. research rotation advisor*, Tyler Lovelace, CMU Computational Biology Department, 9/10/2018–10/7/2018. Topic: Reinforcement learning for steering T Cell Adaptation.

15. *Ph.D. committee member (and co-author / unofficial co-advisor; advisor was Avrim Blum)*, Martin Zinkevich. Dissertation *Algorithms with Performance Guarantees for Multiagent Settings* defended 8/25/2004. Carnegie Mellon University, Computer Science Department.

16. *Ph.D. committee member (and co-author / unofficial co-advisor; advisors were Pradeep Khosla and Ramaya Krishnan)*, XiaoFeng Wang. Dissertation *Multiagent Coordination under Untrusted and Uncertain Environments* defended 6/8/2004. Carnegie Mellon University, Department of Electrical and Computer Engineering. (2 of 4 research contributions chapters were based on joint papers between Sandholm and Wang.)

17. *Ph.D. committee member*, Emanuel Tewolde. Carnegie Mellon University, School of Computer Science.

18. *Ph.D. committee member*, Fabian Pieroth. PhD dissertation "Equilibrium Learning and Verification in Games of Economic Interaction". Decision Sciences and Systems, School of Computation, Information and Technology, Technical University of Munich, Germany.

19. *Ph.D. committee member*, Caspar Oesterheld. PhD dissertation "New foundational ideas in cooperative AI" defended 1/30/2026. Carnegie Mellon University, School of Computer Science.

20. *Ph.D. committee member*, Keegan Harris. PhD dissertation "Incentives, Information, and Uncertainty in Data-Driven Decision Making" defended 6/6/2025. Carnegie Mellon University, School of Computer Science.

21. *Ph.D. committee member*, Hanrui Zhang. PhD dissertation "Designing and Analyzing Machine Learning Algorithms in the Presence of Strategic Behavior" defended 5/1/2023. Carnegie Mellon University, Computer Science Department. Advisor: Vincent Conitzer.

22. *Ph.D. committee member and co-author*, Chun Kai Ling. Topic: Solving extensive-form imperfect information Stackelberg and team games. Carnegie Mellon University, Computer Science Department. Advisors: Zico Kolter and Fei Fang.

23. *Ph.D. committee member*, Arun Sai Suggala. Dissertation "Statistical Game Theory" defended August, 2021. Carnegie Mellon University, Machine Learning Department. Advisor: Pradeep Ravikumar.

24. *Ph.D. committee member*, Elias Khalil. Georgia Institute of Technology, School of Computational Science and Engineering, College of Computing. Dissertation "Towards Tighter Integration of Machine Learning and Discrete Optimization" defended March, 2019. Advisor: Bistra Dilkina. First position (but decided to do a postdoc before starting): Assistant Professor, University of Toronto, Industrial Engineering.

25. *Ph.D. committee member*, Sanjana Gupta. CMU-Pitt Computational Biology Program. Tentative dissertation proposal title (Nov 2016): "Statistical and mechanistic approaches towards understanding dynamic inflammatory signals". Advisors: James Faeder and Robin Lee.

26. *Ph.D. committee member*, David Kurokawa. PhD dissertation"Fair Division in Game Theoretic Settings" defended 7/26/2017. Carnegie Mellon University, Computer Science Department. Advisor: Ariel Procaccia. First job after graduation: Google.

27. *Ph.D. committee member*, Nisarg Shah. PhD dissertation "Optimal Social Decision Making" defended 6/28/2016. Carnegie Mellon University, Computer Science Department. Advisor: Ariel Procaccia. First position (but decided to do a postdoc before starting): Assistant Professor, University of Toronto, Computer Science Department.

28. *Ph.D. committee member*, Jamie Morgenstern. PhD dissertation "Market Algorithms: Incentives, Learning, and Privacy" defended May 2015. Carnegie Mellon University, Computer Science Department. Advisor: Avrim Blum.

29. *Ph.D. committee member*, David Bergman. PhD dissertation "New Techniques for Discrete Optimization" defended May 2013. Carnegie Mellon University, Tepper School of Business, Algorithms and Combinatorial Optimization program. Advisors: Willem-Jan van Hoeve and John Hooker.

30. *Ph.D. committee member*, Zhengyu Yin. PhD dissertation "Addressing Uncertainty in Stackelberg Games for Security: Models and Algorithms" defended 3/5/2013. University of Southern California, Department of Computer Science. Advisor: Milind Tambe.

31. *Ph.D. committee member*, Konstantin Salomatin. PhD dissertation "Large-scale hierarchical optimization for online advertising and wind farm planning" defended 8/2013. Language Technologies Institute, School of Computer Science, Carnegie Mellon University. Advisor: Yiming Yang.

32. *Ph.D. committee member*, Ben Lubin. Thesis "Combinatorial Markets in Theory and Practice: Mitigating Incentives and Facilitating Elicitation" defended 7/23/2010. Harvard University. Advisor: David Parkes. First job after graduation: tenure-track assistant professor in the business school at Boston University.

33. *Ph.D. committee member*, Matt Streeter. Dissertation "Using Online Algorithms to Solve NP-Hard Problems More Efficiently in Practice" defended 12/10/2007. Dissertation proposal "Online Selection, Adaptation, and Hybridization of Algorithms" defended 11/30/2006. Carnegie Mellon University, Computer Science Department. Advisor: Stephen Smith. First job after graduation: Google.

34. *Ph.D. committee member*, Radu Jurca. Dissertation "Truthful Reputation Mechanisms for Online Systems". Defense 10/18/2007. Faculté d'Informatique et Communications,

École Polytechnique Fédérale de Lausanne (EPFL). Advisor: Boi Faltings. This dissertation won the following awards: IFAAMAS Victor Lesser Distinguished Distinguished Dissertation Award, EPFL best thesis award. First job after graduation: Google.

35. *Ph.D. committee member*, Daniel Bernstein. Dissertation "Complexity Analysis and Optimal Algorithms for Decentralized Decision Making", defended 5/27/2005. University of Massachusetts, Amherst, Computer Science Department. *UMass nomination for ACM Distinguished Dissertation Award.* Advisor: Shlomo Zilberstein.

36. *Ph.D. committee member*, Pedro Ferreira. Dissertation "Interconnected Communication Networks Provisioned Selfishly" defended 9/23/2004. Carnegie Mellon University, Department of Engineering and Public Policy. Advisor: Marvin Sirbu. First job after graduation: postdoc at UC Berkeley. Then, assistant professor of Engineering and Public Policy at Carnegie Mellon University.

37. *Ph.D. committee member*, John Dorsey. Dissertation *Game-Theoretic Power Management in Mobile Ad Hoc Networks* defended 7/15/2004. Carnegie Mellon University, Department of Electrical and Computer Engineering. Advisor: Dan Siewiorek.

38. *Ph.D. committee member*, Bernardine Dias. Dissertation "TraderBots: A New Paradigm for Robust and Efficient Multirobot Coordination in Dynamic Environments" defended 1/7/2004. Carnegie Mellon University, Robotics Institute. Advior: Tony Stentz. First appointment after graduation: special research faculty in the School of Computer Science at Carnegie Mellon University.

39. *Ph.D. committee member*, Michael Bowling. Multiagent Learning in the Presence of Agents with Limitations. Carnegie Mellon University, Computer Science Department. Dissertation defended 4/14/2003. Advisor: Manuela Veloso. First appointment after graduation: tenure-track assistant professor in the computer science department at University of Alberta, Canada.

40. *D.Sc. committee member*, Yunhong Zhou. Shape-Sensitive Geometric Complexity. Dissertation defended 10/6/2000. Dissertation proposal defended 5/22/2000. Washington University, Department of Computer Science. Advisor: Subhash Suri. First appointment after graduation: research staff member at the Compaq System Research Center in Palo Alto, CA.

41. *D.Sc. committee member*, Amy Murphy. Enabling the Rapid Development of Dependable Applications in the Mobile Environment. Dissertation defended 7/18/2000. (Dissertation proposal defended 6/3/1999.) Washington University, Department of Computer Science. Advisor: Catalin Roman. First appointment after graduation: tenure-track assistant professor in the computer science department at the University of Rochester.

42. *D.Sc. committee member*, Michael DeVore. Automatic Target Recognition from Synthetic Aperture Radar Imagery. Washington University, Department of Electrical Engineering.

43. *D.Sc. committee member*, Srinivasan Venkatachary. Efficient Algorithms for IP Lookups and Packet Classification. Dissertation defense 6/29/99. Dissertation proposal defense 4/14/99. Washington University, Department of Computer Science. First appointment after graduation: researcher at Microsoft Research.

44. *Ph.D. committee member*, Huibin Yan. Coalitional Bargaining with a Random Proposer. Washington University, Department of Economics. First appointment after graduation: tenure-track assistant professor at University of California Santa Cruz, Department of Economics.

45. *Ph.D. committee member*, Yuxin Chen. Targetability and Individual-Marketing Competition. Dissertation defense 4/28/99. Washington University, Olin School of Business. First appointment after graduation: tenure-track assistant professor at New York University's Stern School of Management.

46. *Ph.D. committee member*, Sami Dakhlia. The role of critical equilibria in applied general equilibrium models. Dissertation defense 5/1/98. Washington University, Department of Economics. First appointment after graduation: postdoctoral research fellow at the University of Montreal.

47. *Data analysis project reading committee*, Michael Spece Ibanez, PhD student, Machine Learning Department, CMU. Project topic: Prioritized sweeping in the counterfactual regret algorithm. 1/2012-12/2012.

Masters students

1. Benjamin Clayman (poker).

2. *M.S. advisor*, Noam Brown, obtained M.S. degree at CMU Robotics Institute along the way toward Ph.D. MS thesis "Regret Transfer and Parameter Optimization" defended 5/27/2014.

3. *M.S. advisor*, John Dickerson, obtained M.S. degree at CMU Computer Science Department in May 2014 along the way toward Ph.D.

4. *M.S. thesis reviewer.* Joint thesis by Girgio Patrini and Marco Rocco. "Local Search Techniques for Nash Equilibrium Computation with Bimatrix Games". Advisor: Nicola Gatti. Politecnico di Milano, Italy, December 2011.

5. *M.S. advisor*, Kate Larson. 8/97–12/99. Washington University, Department of Computer Science. Obtained M.S. degree 12/99 along the way toward Ph.D.

6. *M.S. thesis advisor*, Martin Andersson. 8/97–10/99. Performance of Leveled Commitment Protocols for Automated Negotiation: An Empirical Study. Defended 10/25/97. Washington University, Department of Computer Science. Degree from the Royal Institute of Technology, Stockholm, Sweden. First appointment after graduation: an ecommerce startup company in Sweden.

7. *M.S. advisor*, Qianbo Huai. 8/97–10/99. Worked on *eAuctionHouse*, a next generation Internet auction prototype. Graduated May-99. Washington University, Department of Computer Science. First appointment after graduation: Microsoft.

8. *Licensiate (M.S.) thesis advisor*, Vincent Ferrandon. Safe Exchange Planner. Thesis done while Vincent was a visiting scholar in Dr. Sandholm's lab at Washington University, Department of Computer Science, 3/99–12/99. Thesis for Advanced Automatics and System Engineering, Ecole Nationale Superieure de l'Aeronautique et de l'Espace, Toulouse, France.

9. *Academic advisor*, Alan Huffman. Graduated with an M.S. in August-99. Washington University, Department of Computer Science. Thesis advised by Dr. Ron Cytron.

10. *M.S. advisor* (course option), John Olsen. Graduated May-99. Washington University, Department of Computer Science.

11. *M.S. committee member*, Mihai Tutunaru. Value Numbering for Java Programs. Graduated 5/98. Washington University, Department of Computer Science.

12. *M.S. committee member*, Junyao Zhang. New Selection Schemes for Genetic Algorithms. Graduated 5/98. Washington University, Department of Mechanical Engineering.

13. *M.S. committee member*, Sathyamoorthi Krishnamurthy. Robot Navigation. Defended 4/15/98. Washington University, Department of Computer Science.

14. *M.S. committee member*, Marin Bezic. Design and Implementation of a Distributed Data Exploration and Processing System. Graduated 9/97. Washington University, Department of Computer Science.

Undergraduate student research advisor

1. Winston Grenier. Summer project advisor, 2020. Topic: Computational game theory for real-time strategy games. First position afterwards: MS student in CMU MLD. Then after earning the MS, full-time Applied Research Software Engineer at Strategy Robot, Inc.

2. *B.S. honors project supervisor*, Jonathan Li, Carnegie Mellon University, 1/2018–5/2019. Topics: Visualization of equilibrium-finding algorithms, reinforcement learning for steering T cells.

3. *B.S. honors project supervisor*, Ben Plaut, Carnegie Mellon University, 1/2015–8/2016. Topic: Batch clearing algorithms for kidney exchanges with chains.

4. Kevin Su (BS & MS Student), Carnegie Mellon University, 10/2012–1/2013. Topics: Leveraging machine learning for action abstraction in incomplete information games, poker.

5. *B.S. honors project supervisor*, Zhijian Lim, Carnegie Mellon University, 9/2003–6/2004. Topic: Building an expressive negotiation server for donations to charities.

6. Aaron Averbuch (undergraduate researcher), Washington University, 9/1998–12/1998. Helped implement safe exchange planning software.

OTHER PAST RESEARCH SUPERVISING

1. Dr. Stephen McAleer (Postdoctoral Fellow), 1/2022–5/2024. Topics: Equilibrium finding, market design. First job after postdoc: OpenAI. Now at Anthropic.

2. Luca Carminati (Pre-Doctoral Visitor) Spring 2023. Topic: Hidden-Role Games.

3. Tommaso Bianchi (MS-level visitor), half a year in 2019. Topic: Learning to correlate in multi-player extensive-form games.

4. Robin Schmucker (PhD Student), 8/2018–10/2020. Topics: Reinforcement learning for steering T cells, integer programming.

5. Dr. Andrea Celli (Pre-Doctoral Visitor), 1/2018–5/2018. Topic: Equilibrium finding.

6. Dr. Kimmo Berg (Postdoctoral Fellow), 3/2014–12/2014. Topic: Algorithms for finding equilibria in multi-player games.

7. Dr. Fei Peng (Research Associate), 12/2013–9/2015. Topics: Advertising markets, winner determination algorithms, integer programming, automated abstraction, decomposition. First position afterwards: Director of Engineering at Optimized Markets, Inc.

8. Dr. Michael Albert (Visitor) 5/2015–7/2015. Topics: Opponent exploitation, automated mechanism design in auctions.

9. Dr. Marco Rocco (Predoctoral and Postdoctoral Fellow), 10/2014–12/2014. Topic: Theory of expressiveness with respect to revenue in mechanisms.

10. Prof. Nicola Gatti (Visiting Researcher), 2013. Topic: Equilibrium funding in games.

11. Noam Goldberg (Research Associate), 1/2013–8/2013. Topic: Combinatorial advertising markets, integer programming. First appointment after the postdoc: faculty position at Bar Ilan University.

12. Pingzhong Tang (postdoctoral researcher), 7/2010–8/2012. Topics: Revenue-maximizing combinatorial auctions, repeated auctions, voting, automated proofs in game theory and social choice theory, optimal auctions for spiteful bidders. First appointment after the postdoc: Assistant Professor of computer science in Yao's class at Tsinghua University.

13. Siddhartha Jain (PhD Student), 9/2011–2/2013. Topic: Automated Dantzig-Wolfe decompositions for integer programming, combinatorial advertising markets.

14. Eric Zawadzki (PhD Student), 9/08–3/10. Topics: Search, branching, kidney exchange.

15. Kevin Waugh (PhD Student), 9/09–3/10. Topic: Equilibrium finding algorithms in sequential incomplete-information games.

16. Ankit Sharma (PhD Student), 9/2009–1/2010. Topic: Bidders with asymmetric spite in auctions; information acquisition and deliberation in auctions.

17. Michael Spece Ibanez (PhD Student), 5/15/10–12/10. Topic: Algorithms for ϵ-equilibrium in two-person zero-sum incomplete-information games.

18. Prof. Craig Boutilier (sabbatical visitor in Dr. Sandholm's Laboratory at Carnegie Mellon University; on leave from his position as tenured full professor of Computer Science at University of Toronto), 2008–2009. Topics: Display advertising markets, TV advertising markets, combinatorial auctions, preference elicitation in combinatorial auctions, automated mechanism design.

19. Pranjal Awasthi (PhD Student), 11/07–1/09. Topic: Sample trajectory based online algorithms for kidney exchange, branching rules for search and integer programming.

20. Troels Bjerre Sørensen (doctoral student visitor), 7/06–12/06. Topic: Fast algorithms for solving for Nash equilibrium and its refinements in sequential games of incomplete information, automated approximate abstraction, fast compact indexing schemes, poker bots.

21. Robert Shields (PhD Student), 9/05–12/06. Topic: Novel Techniques for Search and Mixed Integer Programming. Left to become a researcher at my company, CombineNet, Inc.

22. Prof. Rudolf Müller, (visitor from University of Maastricht, School of Business and Economics, Department of Quantitative Economics), 9/2005. Topics: Optimal multi-item auctions, automated mechanism design.

23. Dr. Felix Brandt (Postdoctoral Researcher), 9/03–8/04. Topics: Privacy in social choice (particularly in voting and auctions), spiteful bidding in auctions. First appointment after the postdoc: highly selective Habilitation fellowship in Germany. Now Heisenberg Professor at TU Munich.

24. Prof. Paolo Santi. Visiting Scientist (postdoctoral) in Dr. Sandholm's Agent-Mediated Electronic Marketplaces Laboratory at Carnegie Mellon University, 5/03–12/03. Topic: Poly-query preference elicitation in combinatorial auctions.

25. David Abraham (PhD Student), (co-advisor with Avrim Blum), 9/04–9/07. Topic: Kidney Exchanges.

26. Dr. Alexander Nareyek (Postdoctoral Researcher), 1/03–12/03. Topic: Integrating Automated Negotiation and Real-Time Negotiation Planning into Video Games. First appointment after the postdoc: research staff at the Cork Constraint Computation Centre (4C), Ireland.

27. Prof. Makoto Yokoo (visitor from NTT Laboratories and later Kyushu University), 10/2001. Topic: Exchange design.

28. Prof. Sviatoslav Braynov (Postdoctoral Research Associate in Dr. Sandholm's Multiagent Systems Laboratory at Washington University, 6/98–8/00; had received his Ph.D. in Mathematics, Computer Center, Russian Academy of Sciences, Moscow just before). Topics: Incentive-compatible trust mechanisms for ecommerce, deviation-proof multiagent plans, coalition-proof mechanisms, auctions without common knowledge. First appointment after the postdoc: Assistant Professor of computer science at SUNY Buffalo 8/00.

29. Prof. Dov Monderer (sabbatical visitor in Dr. Sandholm's Multiagent Systems Laboratory at Washington University; on leave from his position as tenured full professor of Industrial Engineering at the Technion, Haifa, Israel), 8/99–8/00. Topics: Nonmanipulable reputation mechanisms and collaborative filters, cryptography. Received an endowed chair at the Technion 8/00.

30. Prof. Fernando Tohmé (visiting associate professor in Dr. Sandholm's Multiagent Systems Laboratory at Washington University, 8/96–8/00 (in several slots of a few months each). On leave from his position as tenured associate professor of Mathematical Economics at the Universidad Nacional del Sur, Bahia Blanca, Argentina. Topic: Coalition formation under communication and limited computing.

31. Anton Likhodedov (doctoral student), 1/03–12/05. Topic: Optimal and Approximately Optimal Automated Mechanism Design for Combinatorial and Multi-Unit Auctions.

32. Benoit Hudson (doctoral student), 9/01–1/03. Topic: Preference Elicitation in Combinatorial Auctions.

33. B.S. Andy Martignoni (doctoral student), 9/99-12/00 (stayed behind at Washington University for family reasons as I moved to CMU). Topic: Experiments on a new backup rule for gametree search.

UNIVERSITY SERVICE

5/2025– **President's Special Committee on Computer Science Vision**
Carnegie Mellon University, Computer Science Department.

7/2024– **AI Area Advocate (aka AI ombudsman)**
Carnegie Mellon University, Computer Science Department

2017– **CMU AI, one of four Directors**
Carnegie Mellon University

6/2007– **Olympus Advisory Cabinet**
Carnegie Mellon University, School of Computer Science.
Project Olympus is a new initiative designed to create and sustain Next Generation Computing innovation for Western Pennsylvania.

2019– **Official Mentor to Individual Junior Faculty**
Tim Dettmers (2025–)
Nihar Shah (2019–)
Zico Kolter (2019–2024)
Marijn Heule (2019–2020)
Carnegie Mellon University, School of Computer Science

2014– **Member of Reading Committees of several junior faculty members for Reappointment and Promotion**
Carnegie Mellon University, Computer Science Department

Fall 2003– **Speaker's Club**
Faculty member (that evaluates graduate students' speech requirements)
Carnegie Mellon University, School of Computer Science

11/2024–4/2025 **Graduate Admission Committee**
Carnegie Mellon University, Computer Science Department.

9/2023–3/2025 **School of Computer Science (Dean's) Reappointment and Promotion (R&P) Committee**
Carnegie Mellon University

1/2024–6/2024 **Member, Department Head Search Committee, Machine Learning Department**
Carnegie Mellon University

2023–2024 **Member of Zico Kolter's Full Professor with tenure promotion Reading Committee**
Carnegie Mellon University, Computer Science Department

2021–2022 **Chair of Vincent Conitzer's Full Professor with tenure promotion Reading Committee**
Carnegie Mellon University, Computer Science Department

10/2014–9/2016 **University Review Committee for Tenured Faculty**
Carnegie Mellon University

8/2004–1/2019 **AI Area Advocate (aka AI ombudsman)**
Carnegie Mellon University, Computer Science Department

2018 **Chair of Zico Kolter's Associate Professor without tenure promotion Reading Committee**
Carnegie Mellon University, Computer Science Department

2017 **Chair of Ariel Procaccia's Associate Professor with tenure promotion Reading Committee**
Carnegie Mellon University, Computer Science Department

2016 **Chair of Ariel Procaccia's Associate Professor without tenure promotion Reading Committee**
Carnegie Mellon University, Computer Science Department

1/2015–8/2015 **AI seminar (invited speaker) series**
Organizer
Carnegie Mellon University, School of Computer Science

1/2004–2006 **University Committee on Special Faculty Appointments**
Carnegie Mellon University

10/2013–4/2014 **Dean Search Committee**
Carnegie Mellon University, School of Computer Science.

12/2007–5/2010 **Graduate Admission Committee**
Chair 6/2009–5/2010
Member 12/2007–5/2010
Carnegie Mellon University, Computer Science Department.

11/2006–6/2007 **AI faculty hiring filter**
Carnegie Mellon University, Computer Science Department

11/2005–6/2006 **Faculty hiring subcommittee on Foundations of Computing**
Carnegie Mellon University, Computer Science Department

2/2005–10/2005 **Computer Science Department external review preparation committee**
Carnegie Mellon University

9/2005–2010 **University tenure committee**
Carnegie Mellon University

1/2005–6/2005 **AI faculty hiring committee**
Carnegie Mellon University

8/2003–2010 **Berkman Faculty Development Fund award selection committee**
Carnegie Mellon University

8/2001–8/2004 **AI seminar (invited speaker) series**
Organizer
Carnegie Mellon University, Computer Science Department

3/21/2003 **AI at CMU presentation**
At the Open House for Potential New Graduate Students,
Carnegie Mellon University, Computer Science Department

10/2002–3/2003 **Written and Oral PhD comprehensive exam committee, Kevin Tantisevi**
Carnegie Mellon University, Department of Civil and Environmental Engineering

11/2001–2007 **Research Qualifier Committee, Trey Smith**
Carnegie Mellon University, Robotics Institute

7/1997–12/2000 **Graduate Student Admissions Committee**
Chair
Entirely new admissions procedure instantiated
Washington University, Department of Computer Science

10/1998–12/2000 **Faculty Recruiting Committee**
Washington University, Department of Computer Science

8/1998–8/2000 **Undergraduate Advisor**
To about 25 undergraduate students
Washington University, Department of Computer Science

8/1998–8/2000 **Graduate Advisor**
To about 10 M.S. students
Washington University, Department of Computer Science

7/1997–12/2000 **Master's Program Committee**
Washington University, Department of Computer Science

7/1997–12/1998 **International Exchange Committee**
Representative of the Department of Computer Science
Washington University

8/1996–12/2000 **Graduate Student Admissions Committee**
Washington University, Department of Computer Science

6/1997–7/1997 **Doctoral Candidacy Qualifier System Revision Ad Hoc Committee**
One of three members
New system instantiated
Washington University, Department of Computer Science

8/1996–12/2000 **AI curriculum enhancement and modernization planning**
Alone and with Assoc. Prof. Loui and Assoc. Prof. Gillett
3 new courses instantiated
Washington University, Department of Computer Science

5/22/2000 **Doctoral Oral Qualifier, Dan Dooly**
One of three members
4 papers on combinatorial auctions
Washington University, Department of Computer Science

5/22/2000 **Doctoral Oral Qualifier, Kate Larson**
Chair
4 papers on cryptographic techniques for constructing secure auction servers
Washington University, Department of Computer Science

4/10/2000 **Doctoral Oral Qualifier, Yunhong Zhou**
One of five members
3 papers on the theory of nearest neighbors
Washington University, Department of Computer Science

10/28/1999 **Doctoral Oral Qualifier, Michael DeVore**
One of five members
Automatic Target Recognition from Synthetic Aperture Radar Imagery
Washington University, Department of Electrical Engineering

5/10/1999 **Doctoral Oral Qualifier, Sanghyun Kim**
One of five members
3 papers on reinforcement learning
Washington University, Department of Systems Science and Mathematics

5/7/1999 **Doctoral Oral Qualifier, T. Eugene Day**
One of five members
2 papers on optimally locating two facilities with a minimum separation constraint
Washington University, Department of Systems Science and Mathematics

6/16/1998 **Doctoral Oral Qualifier, Amy Murphy**
One of three members
Papers on modeling in mobility
Washington University, Department of Computer Science

1/28/1997 **Doctoral Oral Qualifier, Ram Sethuraman**
One of three members
Washington University, Department of Computer Science